



Notes on the Physical Geography of Bengal

From the Writings and Maps of
Major James Rennell, F.R.S.,

by

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"The Course of Nature is the Art of God."
YOUNG.

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Table of Contents.

Preface.	Page.
Chapter I.—Description of Records consulted	1
Chapter II.—Rennell's Standard of depths for navigation, fords and ferries	6
Chapter III.—Methods followed in describing rivers	10
Chapter IV.—Descriptions of the Ganges, Brahmaputra, Megna, Bhagirathi and Hooghly, Tista and Karatoya rivers	11
Chapter V.—Description of rivers of Map IV	32
Chapter VI.—Description of rivers of Map V	36
Chapter VII.—Description of rivers of Maps VIA and VIB	37
Chapter VIII.—Description of rivers of Maps VIIA and VIIB	43
Chapter IX.—Description of rivers of Maps VIIIA and VIIIB	47
Chapter X.—Description of rivers of Map IX	57
Chapter XI.—Description of rivers of Maps XA and XB	58
Chapter XII.—Description of rivers of Map XI	61
Chapter XIII.—Description of rivers of Map XII	73
Chapter XIV.—Description of rivers of Maps XIII A, and XIII B	78
Chapter XV.—Description of rivers of Maps XIVA and XIVB	79
Chapter XVI.—Low lying areas— Part (i) Subject to annual inundation	82
Part (ii) Swamps	84
Chapter XVII.—High lands	88
Chapter XVIII.—Tidal information	90
Chapter XIX.—Embankments	93
Chapter XX.—Road communications	94
Chapter XXI.—Beheaded rivers	96

Maps (in a separate cover).

Maps IV to XIV of Rennell's 5 miles to 1 inch series of Bengal, enlarged to 4 inches to 1 mile (except Map IX which is on the original scale). Of these maps Nos. VI, VII, VIII, X, XIII and XIV are each in two portions, making 16 maps on the 4 mile scale, and 1 map on the 5 mile scale.

PREFACE.

These notes contain all the useful information regarding the Physical Geography of Bengal that I have been able to extract from the extant remains of the work of James Rennell. Except where otherwise stated the period considered is that from May 1764 to the end of 1776.

The notes are the result of sporadic effort spread over some eleven to twelve years and they have been compiled for two reasons:—First, they may have a value in the somewhat distant future, if they survive. Secondly they may be useful in the present day.

The arrangement of the notes is probably open to criticism which will vary according to the angle of vision of the reader. The arrangement followed is the only one I could devise which would save a great deal of repetition.

Rennell has left a certain amount of information regarding the Province of Bihar and Orissa, which I have not included in these notes. As regards Assam, the districts of Goalpara and Sylhet have been included to round off the information available. No further information regarding Assam exists.

As far as possible I have avoided contentious matter. But it has not been possible to avoid pointing out, here and there, certain directions of investigation which Rennell's results suggest. In some cases it may be thought that I have given information that is of no use now-a-days. It should be remembered, however, that the notes attempt to cover what may be of use hereafter.

The reader is asked particularly to study both the maps and the notes as a whole, or he may easily come to wrong conclusions.

From Chapter IV onwards to the end of chapter XX, where square brackets are used in the letter press they refer to my own additions, conclusions, or suggestions.

I have attempted to follow no definite rule in the spelling of names and have merely aimed at obtaining intelligible results. Rennell's spelling is very erratic, and he often uses alternative spellings for one name.

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CALCUTTA;

Dated the 17th June 1922.

CHAPTER I.

Records consulted.

General information.—Whilst employed upon survey work in Bengal between 1764-1776, and after leaving India until his death in 1830, Rennell produced, in published or unpublished form, information from which a tolerable description of the Physical Geography of Bengal for that period can be compiled.

But it must be remembered that Rennell's work was not carried out with any intention that it should be used for such a purpose. Thus it occurs that relevant information must be collected from a number of different sources, some of which have only come to light in the last twelve years.

In 1910 Mr. J. H. D. LaTouche of the Geological Survey of India, edited and published Rennell's personal diary (1764-1767). This diary contains much information and has formed a very important link in the collating of other records by Rennell. But portions of the diary would have been well nigh unintelligible, from the standpoint of these notes, without larger scale maps by Rennell than those which then existed in India. A set of such larger scale maps was in the India Office, but it had been marked, years before, as of no practical value, by the late Sir Clements Markham. In 1916 I first saw those maps in the India Office and obtained permission for their photographic reproduction.

The diary and these large scale maps completed the chain of Rennell's evidence, supported by other works of the existence of which I knew.

2. Records consulted.—In this compilation I have made use of the following:—

(a) *Rennell's Diary 1764-1767*, edited by LaTouche and published in the Memoirs of the Asiatic Society of Bengal (Vol. III, Part 3; pages 99 to 248; 1910) hereafter referred to as the "*Diary*".

(b) *Rennell's description of the Roads in Bengal and Bihar, 1778*, containing a small scale index map which shows the more important roads. Hereafter referred to as "*Road Routes*".

(c) *Rennell's Tables and Distances from Calcutta, etc., through the Principal Inland Navigations, 1781*, with a small scale map showing, by separate symbols, rivers that were perennially navigable, and those only navigable for a part of the year. Hereafter referred to as "*Water Routes*"; the map being called "*Navigation Map*".

(d). "*Rennell's Memoir of a Map of Hindoostan or the Mogul Empire*" 1st Edition 1788. Hereafter referred to as the "*Memoir*".

(e) *An Atlas of formerly unpublished maps by Rennell; published by me in 1917*, accompanied by a *Memoir* describing the extant remains of Rennell's map records. These maps are on larger scales than those given in the Atlas published first in 1779-1780, which atlas was republished by the Surveyor General of India in 1911; I have made no use of these earlier atlases, having already found their information insufficient, before the larger scale maps were published in 1917. Hereafter the 1917 Atlas is referred to as the "*Atlas*", plate numbers referring to the 1917 publication.

Each of the records briefly described above needs more detailed description at this stage, since it is essential that their inter-relation be properly understood, and since the idiosyncracies from which some of the records suffer require explanation.

3. Rennell's Diary 1764-1766.—*The "Diary"*. Unfortunately the Diary only exists for the period May 1764 to March 1767, and for that period has been very carefully edited by Mr. LaTouche; where possible I have used Mr. LaTouche's footnotes, but since he edited the diary in an all round way, and since I use it here in a somewhat specialized manner, it may be taken

that references to Mr. LaTouche's footnotes are not many in number. Further in 1910 Mr. LaTouche had not the advantage of Rennell's large scale maps, which I have found invaluable. The Diary includes a number of detached tables and records of points of interest which I have drawn upon where necessary.

There is another Diary by Rennell, for the same period, in the India Office. I have made no use of it, but from a cursory examination of it in 1916, I believe that it is occasionally discrepant (in minor and unimportant details) from the Diary edited by Mr. LaTouche.

In references to the Diary hereafter, the page quoted after the word Diary is the page number of Volume III, Part 3 of *the Asiatic Society's Memoirs of 1910*.

4. **Rennell's Road Routes.**—The title page of this Volume, which was published by the East India Company in 1778, is as follows:—

“ A description of the Roads in Bengal and Bihar containing :—

I. The direct Roads from Calcutta to all cities, towns, and places of note in Bengal and Bihar; showing the measured distances between the stages, and the number and situation of the fords and ferries that are to be crossed.

II, III, IV. The direct Roads from the three other Cities, *viz.*, Moorsshedabad, Patna, and Dacca; arranged in the same manner.

V. The Cross Roads from the subordinate Military stations and Factories, to all the places of note within their respective Neighbourhoods, with an Index.”

This book contains 281 pages giving details of many hundreds of road routes. The book contains a preface, which, with respect to the fords and ferries offers the following explanation:—

“ With respect to the rivers It is well known to gentlemen who have resided in Bengal, that few rivers or nullahs* that exist in the dry season can be fordable during the rainy season, or for some months afterwards: *the fords therefore must be understood to continue only from December to June.*

The Road Routes contain an index map on the scale of about 66 miles to 1 inch; but that map does not show all the roads described. I have found the map of little use, except as a help in tracing road details in the book, which, in places, can be very confusing.

At the end of the book is a table showing times of the sun's rising and setting for latitudes between 21°. 30' and 30°. The table was introduced to help the traveller who used the Road Routes, to keep tolerably accurate time. I have made no use of this table, but mention it here as an example of Rennell's thoroughness.

The question of the positions of fords and ferries has an importance which is discussed in the next chapter. Rennell has not left any standard depth for the maximum depth of a ford. If he had done so, we should have known that between December and June, at any place at which a ford is recorded, there was never more water than the maximum of Rennell's ford standard. A ford, therefore, has a definite significance if its depth standard can be ascertained. But a ferry is a different matter. Ferries might easily pass across fordable rivers when sufficient traffic existed to make the cost of the up-keep of a ferry worth while. It will be seen later that the maximum depth standard for a ford was about 36 inches.

In examining the Road Routes against the maps which illustrate these notes, I have been helped by Babu Hari Das Das who did his work well; but when I came to examine it, in the light of a better understanding of Rennell's Road Routes, I found excusable mistakes which necessitated a great deal of re-examination. I do not make these remarks to belittle Babu Hari Das Das' work, which was of a very intricate nature.

* An unimportant river or a spill channel which may run dry in the dry season.

With more information at my disposal, naturally it was far easier for me to examine his work than for him to compile the records of fords and ferries, single-handed, from a confusing directory of the roads.

On the maps which illustrate these notes I have shown as a road, every road shown as such by Rennell on his maps. Thus it will be found that those maps show more roads than occur in the "Road Routes".

I know of only one copy of Rennell's Road Routes; namely that in the Imperial Library, Calcutta.

5. Rennell's Water Routes.—When Rennell published his first Atlas of Bengal (1779-1780) he also published a brief memoir explaining the Atlas, calling it "A Bengal Atlas containing Maps of the Theatre of War and Commerce on that side of Hindoostan—completed from the original surveys and published by the order of the Hon'ble the Court of Directors for the affairs of the East India Company". A brief description of the maps in that atlas, given in a preface, is followed by:—

"Tables of Routes and Distances from Calcutta through the Principal Inland Navigations".

Before these tables is an explanation of how to use them:—

"The first column of Figures shows the intermediate Distances between the Stages; and the second Column the Distances of the several Stages from Calcutta in miles, Halves and Quarters. The letters R and L stand for Right and Left; and point out the Side of the River on which the Place is situated, in going from Calcutta. When the Route goes with the Current of the River, the Names are printed in italics; and when contrary to it, in roman Characters. The names of Cities and Provincial Towns, are in the proper Capitals of each respective Character, but differing in Size. The numbers I, II, III, etc., refer to the Maps* in which the Routes are delineated. When the Passage lies through a Tideway, the word "tide" is inserted in the Margin.

The Calcutta tables are followed by similar tables for routes from Dacca, Murshidabad and Patna; and the book ends with a statement of areas of the different subdivisions of what Rennell looked upon as Bengal, below which is a table of Errata which is of no importance except as regards tidal information for three routes.

In all, the book describes 510 water routes, and it would be thought, from Rennell's description of how to use the tables (already quoted), that considerable information regarding the upper limits of tidal action would be obtainable from the book. Unfortunately this is not the case, and an examination of the routes, in conjunction with tidal information left elsewhere by Rennell, shows that in the Water Routes, he only described, as tidal, *those tidal lengths of rivers in which the tide was an active agent in navigation.*

The book contains a map of Inland Navigation on the scale of about 48 miles to one inch, showing by separate symbols rivers perennially navigable, and those only navigable in the rains. But the scale is so small that it is often hard to follow and the map does not in all cases show rivers regarding which information is available from other sources. To make matters more difficult the descriptions of routes do not always show whether a route is open all the year or not. And, lastly, the evidence from other sources does not always agree with that shown on the Navigation Map.

I know of only one copy of this book† and it is in my own possession. I bought it in Calcutta in the days when considerable stores of old books in the hands of Indian book merchants were common. I believe that fires destroyed most of these hunting grounds, long before their valuable contents were properly known. I propose to give the book to the Imperial Library as soon as these notes are completed. In my copy the Navigation Map is dated 1792; but it is a facsimile of the 1781 map which is found in Rennell's Memoir of a Map of Hindoostan, 1788.

* That is the numbers of the plates in Rennell's small scale Atlas.

† Since writing the above another copy of this work has been offered for sale by Messrs. John Grant, Booksellers of Edinburgh.

The concluding words of the preface to this work are these :—

“ In the tables I have not attempted to give the routes in general during the rainy season (which, to be truly useful, should be calculated separately for each month), but contented myself with giving a few of those that are the most useful and least obvious. And as the distances vary with the different degrees of the inundation, I have given them only as they are whilst the streams are confined within their proper beds. For other particulars the maps themselves must be consulted.”

The last sentence evidently refers to the use of small rivers and highly inundated areas when the waters were high.

6. **The “Memoir”**.—There are three editions of Rennell’s “Memoir of a Map of Hindoostan”; I have used the first edition, which is dated 1788; the two other editions are dated 1792 and 1793.

Only two portions of the book have reference to the subject of these notes :—

First: Section III upon “The surveyed tract on the side of Bengal; or that occupied by the course of the Ganges, and its principal branches, as far west as the city of Agra”.

Secondly: “An account of the Ganges and Burrampooter Rivers.” This latter is an appendix and is a reprint of Rennell’s original account of the two great rivers, which account appeared in the Philosophical Transactions of the Royal Society 1781.

I have not included in these notes everything which Rennell has included in the “Memoir” regarding Bengal’s physical conditions. He discusses many subjects which, in his time, were unexplored, but which, since then, have been more fully considered. There would be no object in including in these notes speculations by Rennell, whether they be right or wrong, upon subjects which have since been answered decisively. As an example I may quote one case.

Rennell concluded that the Sangpo and Brahmaputra were the same river. Previously Du Halde suspected this fact, but the merit of the conclusion must always rest with Rennell.

7. **“Atlas Plates” of the 1917 Atlas**.—These plates are described in some detail in the Memoir* which I published with the new atlas in 1917. To avoid unnecessary reference to that Memoir I have included in these notes sufficient information regarding the plates referred to, for all purposes except perhaps the use of Rennell’s maps in the relaying of river banks, etc., for Revenue purposes. Besides the seventeen maps† attached to these notes, I have had to refer to others, and a student of river movements or river questions generally should not neglect to examine those maps himself‡. Copies can be obtained from the Director of Surveys, but the supply is very limited, and the maps can generally only be supplied upon loan.

The 17 maps used to illustrate these notes, with the exception of Plate IX (Chittagong) are rough photographic enlargements to the scale of 4 miles to 1 inch from Rennell’s original 5 miles to 1 inch maps of Bengal. Plate IX was not enlarged because the information regarding the Chittagong District is very meagre. The reason for enlarging Rennell’s maps slightly was to bring them to a scale which would enable direct comparison with modern maps. But, of course, rigid comparison will give slightly inaccurate results because amongst other reasons, Rennell’s surveys were not so accurate as modern surveys, and again because photography has introduced some distortion. For all practical purposes, however, the maps should suffice.

I did not feel warranted to spend more money than could be avoided upon these enlargements, which accounts for their roughness. When made I suspected that I might have to pay for them myself.

* *The Surveys of Bengal* by Major James Rennell, F. R. S.—1764—1777 Bengal Secretariat Book Depot 1917. Now out of print, but copies exist in the Collectorate and other Government Libraries of Bengal.

† The maps are numbered IV to XIV, several being described in portions marked A and B. I have retained Rennell’s original numbering which explains why the sequence starts at No. IV.

‡ A few copies of my Atlas of 1917 are available from the Bengal Government Book Depot. But copies were supplied originally to most of the Government Libraries.

Each of the seventeen maps has been coloured to show the following information, all of which of course is taken directly from Rennell's works and refers to the period 1764-1776 :—

- (i) Rivers perennially navigable (continuous Blue).
- (ii) Rivers navigable for the part of the year (crossed by Blue strokes).
- (iii) Rivers about which no information is available (Black).
- (iv) Rivers about which doubt as to navigability exists [by both symbols (i) and (ii)].
- (v) Elevated tracts of old alluvium (Yellow).
- (vi) Roads (Red).
- (vii) Main depressed areas (burnt Sienna).
- (viii) Very rough limits of tidal action (Purple).
- (ix) Areas subject to annual inundation (Green).

I have used these symbols occasionally in amplification of the details of information given above. Such cases will be obvious from the context of the maps upon which they appear.

8. **Scope of these notes is limited.**—It was my wish to have amplified these notes greatly and to have included a similar description of the Physical Geography of Bengal at the present time; and probably to have attempted a similar set of notes dealing with a period intermediate between Rennell's and the present time.

There is much valuable information to be derived from Montgomery Martins' works, and from the maps and records of the old Revenue Surveys of Bengal—as well as from other sources—in regard to an intermediate period. Much of this information has never been examined systematically. The Revenue Survey maps alone contain information in the nomenclature of rivers which is of the greatest value in tracing the earlier history of the river distribution of Bengal. If Rennell had had a small proportion of such information, undoubtedly he would have used it deductively. And Montgomery Martin found himself in the same position as Rennell. The Cadastral survey of Bengal was expected to have been finished about 1929, but there is little or no hope of the programme being completed by then, owing to the Great War and, to the present financial situation of Bengal. Until that large scale survey is finished no exhaustive treatise on the present Physical Geography of Bengal is possible. But apart from this fact, there are other reasons against the production of any work upon the present-day Physical Geography of Bengal. These reasons in my opinion are avoidable, if co-ordination between certain interests is insisted upon.

The interests at present concerned do not seem to harmonize, if we consider their results. For instance, the existing controversy between the Sanitary Department and Engineers, regarding the advantages and disadvantages of embankments leads to little result, possibly because the interests of each side are so great that neither can make any real sacrifice.

9. I have been very careful to support statements made in these notes by full references as to their origin in Rennell's works.

CHAPTER II.

Rennell's Navigation, Ford and Ferry standards.

[Full references are not given in this Chapter. They will be found in the various descriptions of the rivers mentioned here.]

10. **No definite standards left by Rennell.**—Rennell has left no definite standards for navigation draft, fords, or ferries, and if these are to be established they must be deduced from the general information found in Rennell's Records.

11. **Ferries.**—It stands to reason that a ferry could ply over water of any depth, so long as a boat would float; and a very careful examination of Rennell's records show that ferries often plied across rivers that were fordable. A further examination also shows that where streams were shallow, ferries were generally only maintained on routes between important places. Therefore, we may conclude that a ferry recorded in the Road Routes affords no indication of the depth of the river where the ferry crossed. Ordinarily speaking, for rivers that Rennell considered to be perennially navigable, only ferries, and no fords, are recorded throughout the navigable reaches. There are some exceptions to this which are discussed in detail later on; for the present it will suffice to remember that as a general rule fords are very exceptional across rivers always navigable by Rennell's navigation draft standard.

12. **Fords.**—A ford is some definite indication of depth, or rather lack of depth.

In the preface to the Road Routes, Rennell explains that in the rainy season few rivers are fordable "*the fords therefore must be understood to continue only from December to June.*" Thus the fords only relate to the state of a river at low and comparatively low water.

An examination of Rennell's Diary shows that in no single case does he record a greater depth than 3 feet of water at a place where he refers to a river as fordable. There is, however, one possible exception.

This possible exception is mentioned under the description of the Bonaash (Manas) River in Chapter VII, page 41. A ferry existed over the Barally River at Charpongy on the Bijnee road. On 12th December 1765, the river was 150 to 200 yards wide and too rapid to "ford". Its depth was then 4½ feet. I take the reference to a ford here not to be the depth of the river, so much as to the rapidity of its current.

It will be seen later that Rennell's minimum navigation draft standard was probably about 42 inches. Fords are only recorded across perennially navigable rivers in the very few cases which have been referred to already and which will be discussed later on. Fords occur very frequently indeed over rivers which were only navigable for a part of the year, or which are not described as navigable at any time.

The inference is that the ford standard was smaller than the navigation standard, and was in the neighbourhood of a maximum of some 3 feet of water; or the most that a palanquin or bullock cart could pass through conveniently, or a man without deep wading.

13. **Navigation Draft Standard.**—This standard should be easy to establish, but for various reasons it presents difficulties. The following information is available:—

Diary page 109.—Governor Vansittart's instruction to Rennell were couched in the following words contained in a letter dated 6th May 1764:—

"The first service on which you are to be employed is the survey of the great river (Ganges) to the Eastward of Jelenghee; and upon this survey your particular object must be to find out the shortest and safest Channel leading from the great River to Channel Creek or Rangafulla.*"

* For descriptions of these Creeks (Map XIV B.), see Chapter XV, page 79, et seq.

For this purpose you will coast along the south side of the great river and will examine every Creek or Nulla which runs out of it to the Southward, tracing them as far as you find them navigable for boats of three hundred maunds burden, and informing yourself by enquiry from the country people whether they are like navigable all the year; of which circumstance you may yourself form a tolerable judgment by the appearance and steepness of the banks."

* * * * *

Diary page 116.—Three hundred maund boats drew 2 to 2½ cubits.

Diary page 116.—Three hundred maund boats drew 20 to 2½ cubits.

The standard of draft, therefore, for perennial navigation, as first adopted by Rennell, was 36 inches to 49½ inches and there can be no doubt that Vansittart's instructions referred to loaded boats.

The reason why Vansittart sought perennially navigable approaches from the Ganges to Calcutta by such a roundabout route as the Channel and Rangafulla Creeks was that the direct approaches to the Ganges from Calcutta northwards, were not always navigable.

✓ *Memoir page 259.*—The Bhagirathi (map XIII B) below its off-take from the Ganges was commonly dry from October to May; and the Jellinghy "although a stream runs in it the whole year", in some years was not navigable during the two or three driest months. What is now known as Mathabangha River which joins the Hooghly near Chogda (Map XI) is nowhere considered by Rennell as a perennially navigable channel from the Hooghly to the Ganges.

Thus in 1764 Vansittart had no option but to seek a route to the Ganges by the Rangafulla or Channel Creeks, since the only other possible route (Tolly's Nulla) was not canalized until 1777.

The importance of reducing the distance between Calcutta and the Ganges to the minimum possible is emphasized by the following figures left by Rennell:—

Water Routes.	DISTANCES FROM CALCUTTA IN MILES.		
		Patna.	Dacca.
Northwards by Jellinghy River	514	369½
Southward by Channel Creek	864	450½

Rennell, therefore, started work by examining the Creeks* and Rivers which took off southwards from the Ganges in the direction of the Sundarbans; he commenced work near Jellinghy (Map XI) going down stream, examining each off-take which might lessen the distance to Calcutta by passing alternatively through the Rangafulla or Channel Creeks; and in that examination, as soon as a maximum low water draft of approximately 3 feet was found, the creek was abandoned and search made for another route. Thus, in his examination, the Comer and Gorroy Rivers were discarded as useless for his purposes; and it was not until he came to the Chundnah (Chandna) that Rennell continued exploration Southward. These facts show that Rennell kept carefully in mind the instructions given him by Vansittart.

But Rennell had left India about four years before he published his Water Routes and Navigation Map; and the examination referred to above was commenced in 1764. It is possible that in the more general consideration of navigation for the whole province, as against the more narrow aspect first laid down by Vansittart, Rennell may have adopted a lower standard of draft for perennial navigation than Vansittart had suggested. But if Rennell did change his standard the inferential evidence of his ford standard points to his having changed it very little indeed. The draft of a 300-maund boat has been shown by Rennell's calculation, to be 36 to 49½ inches; we may safely take the mean of these (say 43 inches) as the *minimum* draft standard that Rennell took initially, as a 300-maund boat drawing

* Rennell used the word "Creek" for any minor river; to discriminate between a large and small stream with the same name, or as the adjunct of an old bed deserted by a large river.

36 inches (as will be seen later) would be nearly empty. There seems no real reason, therefore, to suppose that Rennell started with one standard, and later reduced it by a mere six inches.

I have obtained figures * for present-day drafts of certain country boats in order to compare with Rennell's figures :—

		Empty.	Half-full.	Full.
		Ft.	Ft.	Ft.
150-maund boat	..	1.5	3.0	4.0
300 „ „	..	2.5	4.0	4.5
2,000 „ „	..	4.5	..	7.5

It will be observed that a draft of 42 inches for a 300-maund boat would mean that the boat was not half-full. The above figures are however only rough and were obtained from a few boats that happened to be in Calcutta last month.

14. **Discrepancies in records of navigation standard.**—If we assume the maximum depth of a ford to be 36 inches and the minimum navigation standard 42 inches, there are certain discrepancies in Rennell's records which contradict that assumption. Each of these discrepancies must be considered in detail. They occur in seven rivers :—

Jellinghy River (Map XI).—This is shown as always navigable in the *Navigation Map*, and as fordable at several places in the *Road Routes*. The evidence of the *Water Routes* is not clear. Rennell in his other records refers to the river as falling to a negligible stream in the dry season. And, if the river had been always navigable for 300-maund boats, Vansittart would never have given his original instructions to Rennell. If the description of this river, given in Chapter XII, page 61, is read, it will be seen that the river was not perennially navigable, and that the *Navigation Map* is in error.

Damoodah River (Maps XIV A & B).—This river was always navigable by the *Navigation Map* as far up as Burdwan. By the *Water Routes* (Routes 17 and 134) it would appear to have been always navigable at least to Burdwan, if not for some 123 miles further up. The evidence of the *Water Routes* is not clear and I doubt if it is reliable even as far up as Burdwan. By the *Road Routes* the river was fordable from Rajbuhaut (above Omptah) in the cold weather at several points.

The evidence regarding this river apparently is contradictory.

Tista and Attri Rivers (Maps VIA, V and XII).—The *Navigation Map* shows this joint river was navigable as far up as Jelpigory (Jalpaiguri) for the whole year. The *Water Routes* are not clear as to perennial or part-year navigation. The *Diary* shows that the river was blocked for perennial navigation at two points (see *Tist and Attri Rivers* Chapter VII, page 37). The *Road Routes* show ferries, but no fords, across the river or its bed. The scale of the *Navigation Map* is so small that it could not show a block in navigation for a short length.

The general evidence is heavily in favour of perennial navigable conditions, particularly if the blocks were of short length, and if the lighting of boats temporarily, or carrying cargo from one to another, are considered as practical possibilities.

Mahananda River (Map IV). This river is shown as always navigable from the Ganges up to Sanashygotia, in the *Navigation Map*. The *Water Routes* give no routes above Mauldah, and they do not show if the river was always, or only temporarily navigable, to that place. Several fords above Nobobgunge† are recorded in the *Road Routes*, but no fords are shown below that place.

* These figures have been obtained for me, by Babu Profulla Chandra Mitra, of my office, from boatmen at Baliaghata and Hatkhola and, from the Toll Office. The figures are not so divergent from Rennell's figures to require comment.

† There are two places of this name on the Mahananda. The one referred to here is that above Mauldah.

The river was from two to three feet deep $4\frac{1}{2}$ miles below Sanashygotta when Rennell crossed it in February 1766. (See description of Mahananda River. Chapter V, page 32.)

The inference is that the Navigation Map is in error, but the point is not proved.

Nagore River * (*Map IV*).—This is shown on the Navigation Map as always navigable up to Taujepour, but the Road Routes show a ford at Churamond, below that place. The river is not included in the Water Routes.

Goggot River (*Maps VI and XII*).—The Navigation Map shows the river as perennially navigable up to Rangpur. The Water Routes corroborate that map. The Diary says that it is only navigable for 150-maund boats up to January. The mean draft (empty and full) of a 150-maund boat is about 33 inches (see table already given in this Chapter). No fords are shown in the Road Routes below Rungpur, but ferries at all points where roads cross the river.

It is not clear to what reaches of the river the reference above, from the Diary, points. It may conceivably refer to the reaches of the river above Rangpur. And some corroboration of this lies in the fact that the Alaikuri Creek, East of Rangpur, was two feet deep at Damino Choccula in mid-November 1765, and the Goggott at Little Jaffergunge, about 8 miles above Rungpur, was 3 feet deep on 22nd January, 1766. In that year the upper reaches of the Goggott (above Rungpur) would have floated a medium-weighted 150-maund boat down to Rungpur. The Allaikuri is shown as a smaller river than the Goggott in Map No. VIA, and it may easily be that the latter river was perennially navigable up to Rungpur.

But the evidence is not quite clear. The fact that no fords occurred South of Rungpur, however, is significant.

Karatoya (Currathya River) *Map V*.—This river is shown on the Navigation Map as always navigable up to Goragat. The Road Routes show fords below that place, at Gobindgunge, Seebgunge, Mustan, Buggorah and Seerpour. One of these is described in the Road Routes both as a ford and a ferry. The Water Routes agree with the Navigation Map.

By the Diary, Rennell was in this neighbourhood in December 1766, but hurried away to Calcutta "by reason of the sudden departure of Lord Clive." It may be that on this account Rennell's information regarding this area was defective, but such a conclusion would be very speculative.

15. Standards deduced.—Apart from the facts set down above, I have observed discrepancies between the Navigation Map and Water Routes in other cases and errors in the Road Routes.† I leave it to the reader to decide how far the following general standards can be accepted:—

- (a) That there was no depth standard for a ferry.
- (b) That the ford standard approximated 36 inches at the time of most water in the season of low water.
- (c) That the general perennial navigation standard was about 42 inches as a minimum.

At the same time, since I have given a description in succeeding Chapters of every river regarding which Rennell has left information, the reader is requested carefully to examine such relevant descriptions, before concluding that the symbols of descriptions used on the maps illustrating these notes can or cannot be followed safely.

* There are other rivers of this name.

† All these errors have been eliminated by clear evidence from other sources.

CHAPTER III.

Methods followed in describing rivers.

16. Difficulty in deciding method to be used.—It has been a matter of some difficulty to decide how to arrange the available information regarding the rivers of the area under examination. A river is seldom limited to the area covered by one of the maps which illustrate these notes; therefore to use the map unit of description is inconvenient. I have adopted a modified system which gives in one place in one Chapter the full descriptions of the following important rivers:—

Ganges, Brahmaputra and Meghna, Bhagirathi and Hooghly, Tista and Attrai; and Karatoya Rivers—(Chapter IV, page 11).

After that the remaining rivers are described, as far as possible, map by map; but, if a river, other than one of those mentioned above by name, falls on more than one map, it is described with the rivers of that map in which the greater part of its course lies. For these descriptions of what may be called subsidiary rivers, separate chapters have been reserved for each Map (see Chapters V to XV). But in an area, in which what is apparently the same river goes by different names for different sections of its course, a further subdivision is needed. Thus in Chapters V to XV, in some cases, I have described the courses of certain rivers first, in order to subdivide the river system on a Map, and so facilitate the explanations of the inter-relation of minor rivers. In other cases to obtain the necessary splitting up of a Map into convenient blocks for description, I have arbitrarily described more than one river, as one river.

This may appear to introduce intricacies unnecessarily. But it must be remembered that these notes are not compiled to enable anybody, necessarily, to find in one place all the details of a specific area in which he may be interested. The notes have not been written for such enquirers, but for students of the subjects dealt with as a whole, and I presuppose that little use will be made of these notes by anybody who cannot find time to peruse the notes from beginning to end. The river system of Bengal was in a fair state of natural equilibrium in Rennell's time and any attempt to study it piecemeal can only lead to wrong conclusions.

At the commencement of each of Chapters V to XV a brief resumé of the contents of that Chapter will be found. The perusal of the resumé will simplify the reading of the later parts of each Chapter.

CHAPTER IV.

Description of the (I) Ganges, (II) Brahmaputra, (III) Megna, (IV) Bhagirathi and Hooghly, (V) Tista and Attrai, and (VI) Karatoya *(Curratty) rivers.

17. This Chapter is divided into six parts, one being devoted to each of the Rivers, or pairs of Rivers, named above.

Each river, or pair of rivers, is divided into sections; and those sections are described at the commencement of each Part of this Chapter.

PART I.

Ganges River.

18. This River is described in four Sections preceded by some general information:—

Section I.—Colgong to the Confluence of the Ganges and Mahananda Rivers. (Map IV.)

Section II.—Onwards to Beturey 8 miles below Jaffirgange—near the present Goalundo. (Map XIII B and Map XI.)

Section III.—From Betturey to the Sea. (Map XI.)

Section IV.—Minor Ganges Channels. (Map XI.)

General information.

19. *Memoir page 258.*—The Ganges was at its lowest in April; and for 500 miles from the sea, *i.e.*, from the Megna Estuary, there was always a channel 30 feet deep at lowest water, until tidal action was met. Tidal action fanned out the river and deprived it of much of its depth so that the lower reaches were not navigable for large *Vessels* of Rennell's time.

Memoir page 260.—The current of the Ganges in the dry months was less than three miles an hour, and during the rains and during the running-off of the inundation, 5 or 6 miles an hour, occasionally increasing to 8 miles an hour. On one occasion Rennell covered 56 miles, propelled by the current alone, in 8 hours. [The figures above refer apparently to the maximum current at and close to the surface.]

Memoir page 261.—Rennell observed that during nine of the years of his total residence in Bengal (1764 to 1776) the Ganges cut its South bank back near Jellenghi $1\frac{1}{2}$ miles, and the Jellinghy River head progressed three-quarters of a mile down-stream during a period of 11 years. At places attacked by the current, Rennell considered a diluvion rate of 1 mile in 10 to 12 years to be the average.

Memoir page 265.—Appearances very strongly favoured the opinion that the Ganges had its former bed in the lakes between Nattore and Jaffirgange (Map XII) striking out of its course as mapped by Rennell (Maps XIII B and XII), near Bauleah (Rampur Boalia) and passing Pootyah.†

With an equal degree of probability ("savoured by tradition") the Ganges could be traced from Jaffirgange to Dacca (Map VIIIA); Rennell thought that a former junction of the Ganges and Megna (Brahmaputra) could alone account for the "amazing" bed‡ of the Megna from Ferringhy Bazar downwards.

* Including the Foolju and Boddussey Rivers (Map XII).

† See description of Chalan and other Beels Chapter XVI, page 84.

‡ See description of Megna River, Part II of this Chapter, page 18.

Memoir pages 257 and 259.—At highest water the Ganges carried one part of solids to three of water; and of the water carried from Colong downwards, one sixth passed down to the Hooghly (Map XI) and the rest went onwards by the main channel towards the Megna.

Memoir page 268.—Rennell considered that as no “ virgin ” soil occurred between Tippera and Burdwan, and none between Dacca and Rampur Boalia (Map XII), the Ganges in course of time had wandered nearly all over the area south of the “ virgin ” soil of Dacca and Rampur Boalia.

Memoir page 266.—Rennell considered that the 8 main openings into the sea (Maps XA and XB) were original main estuaries of the Ganges.

Preface to Water Routes, page 5.—“ The River swells about thirty-one feet perpendicularly from Custee (Map X) upwards ”; but downwards the periodical flood decreased in vertical rise; the decrease was gradual and disappeared when the river reached the sea where the level was the same in both seasons (low and high river levels) at equal phases of tide.

Memoir page 274.—The relative height of river banks gradually decreased as the sea was approached and generally it was possible to judge roughly the height of periodical rise, at any point, by examining the river bank. The vertical rise in a river from low water to its flood levels was proportional to its distance (by the channel and not by direct distance) from the sea. Thus when the river rose 3 feet at Dacca (Map VIII A), the Ganges would rise $6\frac{1}{2}$ feet at Custee (Map XI).

Memoir page 271.—At Jellinghy (Map XI) and at Dacca (Map VIIIA) when observed by Renell in some year between 1764—1777, which year is not stated, the following results were obtained :—

				JELLINGHY.		DACCA.	
				Ft.	In.	Ft.	In.
Total rise in river in—							
May	..	..	..	6	0	2	4
June	..	..	..	9	6	4	6
July	..	..	..	12	6	5	6
August	..	..	..	4	0	1	11
				32	0	14	3

The discrepancy between a rise at Jellinghy of 32 feet recorded here, and a general rise of 31 feet is explained by Rennell, who says that the former figure was obtained in a year of rather higher flood than usual.

Memoir page 268.—The periodical rising of the Ganges is stated slightly differently from the figures given above. The figures below refer to the Jellinghy at its junction with the Ganges :—

From the end of April, 1 inch per diem increasing to 2 to 3 inches until the break of the rains; 5 inches per diem when the rains were established. The river topped its banks by the latter end of July in all the lower parts of Bengal in which it operated.

Memoir page 272.—The fall in the Ganges from highest flood was noted to be as follows :—

Latter half of August and all September	..	3 to 4 inches fall per diem.
October and November and until the end of April	..	3 to $1\frac{1}{2}$ inches fall per diem.

These figures refer to non-tidal lengths and might be disturbed in unusual years. Thus in 1774 the river stayed in flood for about a month longer than in normal times.

The decrease in inundation did not keep pace always with the falls in river levels.

Memoir page 275.—Rennell gives the lowest water discharge—found by measurement—as 80,000 cusecs; and the flood discharge as 405,000 cusecs. The average discharge was taken to be 180,000 cusecs. The flood discharge was obtained by taking flood and low water currents to run as 5 to 3, and the cross section used was increased from low water level, vertically, to the tops of the banks.

[Rennell does not say where or when he made these measurements but I think that they must have been made near Jellinghy, Map XI.]

Memoir page 272.—The Ganges at points about 20 miles apart was fed by two branches of the Tista River (see Map XII) in the cold weather. In the rains the Ganges flowed up these two channels (so small were differences in local level) and the Tista water was forced to pass into the Meghna. [This, it could only have done through the Dhaleswari (Dollesary of Maps XII and VIIIA). The Dhaleswari is probably now a smaller river than it was in Rennell's time, as since then it has lost the water of the Tista.]

The Ganges maintained one main bed from Colgong almost to the sea, it broke into two main channels at Tockya, forming a large island called Azimpour (Map XI). The two streams reunited at the south end of this island, and proceeded again in one main bed, to the sea. But from Jaffirgange downwards there were connections between the Ganges and the Megna; these are best seen on Map VIIIA, the Northernmost channel, of course, being the Dhaleswari. South of that river the Ganges and Megna gradually converged, and here and there were connected by cross streams, running from West to East. But it should be noted that the Ganges and Megna main streams never joined, or at least that their waters did not fully merge, *until after each had reached the coast*. [As is well known the meeting point of the main streams of the two major rivers of Bengal is now near Goalundo (Jaffirgange), which, as the crow flies, is about 100 miles more inland than the point marked by Rennell as the "Conflux" of the Ganges and Megna Rivers (Map XI).]

The off-take rivers from the Ganges, from the Bogrutty (Bhagirathi) downwards, take off from the Ganges in a very peculiar way. An examination of Map XI shows that the Bogrutty, Jellinghy, Comer, Gorroy and Chundnah Rivers, which were spill rivers from the main Ganges, each turned backwards from the direction of flow of the Ganges, and after a somewhat semi-circular initial course, adopted the directions of their final courses. The Hurrigonga does the same thing, but it is not shown clearly in Map XI; for the head of the Hurrigonga see Atlas Plate No. 5.

On the left bank of the Ganges, the Pabna Creek behaved in exactly the same way; as do other Creeks. But from Jaffirgange downwards on both banks of the Ganges this peculiarity occurs less frequently. Above the Bhagirathi, the tendency is not noticeable on either bank. [The reaches between the Bhagirathi and Jaffirgange (Goalundo) therefore contain an abnormality which may be worth investigation.]

Memoir page 255.—(Foot note).—Rennell's maps refer to the Ganges in its whole course through Bengal, as the Ganges River. But Rennell has left the following as record:—"The proper name of this river in the language of Hindoostan (or Indostan) is *Pudda* or *Padda*. It is also named *Bura Gunga*, or the Great River; and *Gonga*, the River, by way of eminence; and from this, doubtless, the European names of the river are derived". [So far as is known Rennell's personal acquaintance with the Ganges River was from Jellinghy downwards.]*

[The name Pudda, as used now, covers the river from the Bhagirathi to Jaffirgange (Goalundo); and thence to the junction of the joint Ganges and Brahmaputra Rivers, with the Megna.] Thus, the name Padda should have been used by Rennell in his maps at least from Jellinghy downwards, even if only as an alternative name to "Ganges".

* See description of Atlas Plate 42 on page 22, of my Memoir on the Surveys of Bengal 1764—1777. (Bengal Secretariat Press 1917.)

Section I—From Colgong to the Mahananda River (Map IV).

20. Navigation map and Water Routes.—The Ganges was perennially navigable for the whole of this Section, but the Creek leading to Colgong was only navigable for about 4 months in the year.

Road Routes.—There were ferries at Caragolah, Sicligully, Rajemal and Chattri; no fords are recorded.

Memoir pages 256 and 55.—From near Rajemal to the end of this Section of the River, the Ganges, in Rennell's time, occupied a comparatively recent channel. The original course of the Ganges was that known as the Cuttaha or Bogrutty (Bhagirathi) and no information is given by Rennell as to when this great change occurred, and he does not appear to have considered that Gaur was deserted because the Ganges deserted its course past Gaur.

Memoir page 55.—"According to Ferishta's account, the unwholesomeness of its air, occasioned it to be deserted soon after Akbar beautified Gaur about 1575 A. D. This is Ferishta's account; but some of its present inhabitants told me that it was deserted in consequence of a pestilence."

[As to the possible relation between the desertion of the Ganges of the Bogrutty Channel, and the great change in the Kosi mouth (from Rajemal to near Cologong) the reader is referred to the description of the Kosi River (Chapter V page 32).]

[Since Rennell has left no information as to the navigability of Ganges Channels where bifurcations occur, I have shown the whole river bed as navigable on map IV.]

Memoir page 255.—At low water there was a 30-foot channel throughout this Section.

Section II—Maps XIII B and XI.

[Section II comprises the river from Nabobgunge, below Mauldah, to eight miles below Jaffirgunge, which was near the site of the present Goalundo.]

21. Navigation Map and water Routes.—These show the river as navigable always, but give no information regarding alternative channels; except for the last bifurcation above Jellinghy. With this exception, therefore, I have only shown the main channel as navigable perennially.

Navigation Map and Diary.—From Jellinghy to Jaffirgunge the whole river and its side channels were navigable except the Southern channels on each side of Pabna.

Memoir page 285.—At low water a 30-foot navigation channel existed.

General remarks to Ganges River.—See remarks already made about the shape of take-off of some of the effluents from the Ganges.*

Diary page 114.—In May 1764 there were many shoals in the river bed below the Comer River head, for some eight miles. In the rains the river was about $2\frac{1}{2}$ miles wide between Hurrysonkur and Callygunge. On 27th May 1764, the water in the river was not more than a quarter of a mile wide below Chacula Island, but would increase to $1\frac{1}{2}$ miles in the rains.

Near Hurrysonkur and Callygunge on 24th May 1764, the top of the main bank was about 30 feet above the level of the water.

Atlas Plate No. I (3 Parts).—This map shows the river on the scale of 500 nautical yards to 1 inch, from Jellinghy to Damadure, but both banks of the river were not surveyed. An inspection of the Atlas Plate will give some idea of where Rennell's work is most reliable.

* Given earlier in this Chapter, page 11.

These reaches were surveyed between 21st and 28th May 1764, but the amount of rise from lowest water, is not recorded. (*Diary page 112.*) But it must have been about 3 feet, as the Jellinghy River at Buxipour had risen 2 feet 3 inches by 16th May 1764.

Road Routes.—Ferries across the river are recorded, but no fords.

Atlas Plate No. 2 (3 Parts).—This map shows the Ganges from Damadure to Custee, and was surveyed on the scale 500 nautical yards to 1 inch by Rennell, between 29th and 31st May 1764, but both banks were not always surveyed; nor is it clear from the Atlas Plate where the accurate work starts and ends.

Road Routes (*Diary page 115*).—A ferry is recorded, but no fords. Between Shawpour and Gurgouree on the South and Burkagassy on the North, the river bed, including islands, in some places was $3\frac{1}{2}$ miles wide on 30th May 1764. But the Southern channel was not always navigable.

Diary page 116.—The right bank of the River was embanked for about 5 miles below Custee (Gorroy River-head). The embankment in early June 1764 was 12 feet high and 14 yards thick. The river was only a quarter of a mile wide (water surface) for some 5 miles East of Custee (early June 1764). On 9th June 1764 the Gorroy River, one mile from its take-off from the Ganges had risen about 6 feet above lowest water. The Ganges therefore, had risen at least that amount.

Atlas Plate No. 3 (3 Parts).—Rennell surveyed the river from Custee to Oddegea between 1st and 17th June 1764 (scale 500 nautical yards to 1 inch), but he did not survey the whole of both banks. Inspection of the Atlas Plate helps little towards showing the limits of actual survey.

The plate shows the embankment East of Custee and another East of Pabna; and one on the left bank South of Peerpour.

Water Routes.—A ferry plied over the river to Pabna. No fords are recorded.

Diary page 116.—The embankment east of Pabna was broken in places. Its age could not be ascertained and its measurements are not recorded.

Atlas Plate No. 4 (2 Parts).—From Oddegea to Saatpour Rennell surveyed the River between 18th and 21st June 1764 on the scale of 500 nautical yards to 1 inch.

The water surface just above Habbaspour is recorded on the map as 3,720 feet across.

It is uncertain which portions of the river banks were surveyed accurately.

Diary page 117.—The channel South of Gubycundarpour (near Sujanagar) was not navigable throughout the year (1764).

Diary page 118.—The Chundnah River by 20th June 1764 had risen 7 feet 6 inches since lowest water. It may be presumed that the Ganges had risen rather more than that amount.

Atlas Plate No. 5 (3 parts).—Between 20th September and 8th October 1764, Rennell surveyed the Ganges from Saatpour to Betturey on the scale of 500 nautical yards to 1 inch. The map shows a limited portion of the river bed West of Jaffirgunge as only $4\frac{1}{2}$ feet deep in the wet season.

Diary page 128.—Both banks of the river were surveyed accurately.

Diary page 126.—By September 25th, 1764, the river had fallen sufficiently for its bed to be clearly defined from Saatpour as far down as Hadgigunge (Ganges Section III). The further Rennell proceeded up the river from the Hadgigunge (up to Saatpour) the greater was the apparent fall in water level.

Below Saatpour (Chundnah River-head) the Ganges was not more than half a mile wide (water surface) on 25th September 1764.

Road Routes.—Ferries are recorded, but no fords.

Diary page 127.—The river was 3 miles wide opposite Jaffirgunge Creek at the end of September 1764.

Section III—Betturey to the Sea.

22. *Atlas Plate Nos. 6 to 14.*—From Betturey downwards to the sea, Rennell surveyed the river on Atlas Plates 6 to 14 inclusive, scale 500 nautical yards to 1 inch, surveying both banks accurately. (*Diary Page 128.*) The dates of survey are given on the Atlas Plates.

Road Routes.—These show ferries below Betturey but no fords.

[Little of the Western channel past Azimpour Island was surveyed accurately. It will be convenient first to deal with this Western bifurcation, and then to consider the rest of the river, from Betturey downwards, as one uninterrupted stream.]

Diary page 136.—About 29th December 1764 Rennell went down the Western branch from Tockya, coming out into the main river near Rottingpour (about 6 miles South-West of Mendigunge):

Diary page 135.—Rennell found this Western channel large, and half to three quarters of a mile wide when he went through it. It was also strongly tidal. [Therefore it must have been perennially navigable.]

Navigation Map.—This map shows the branch as perennially navigable.

Map XI.—We may now return to Betturey. Some miles below Betturey will be found a length of the Ganges marked A, B; on the right is a remark that the river has changed its course there since Map VIII was constructed in 1772. Map XI was made in 1773. This accounts for the difference in the course of the Ganges as shown on Maps VIII A and XI.

Diary page 127.—The island in the river bed North-East of Angordaya had channels one mile wide on the East, and half a mile wide on the West; sandbanks showed in the latter on 12th October. 1764.

Navigation Map.—This shows the whole river as perennially navigable where the island mentioned above is situated. [There has been great change in the Ganges here, as is evidenced by the differences shown in Rennell's different maps, and, as a matter of convenience I have shown both channels as always navigable. The use of Rennell's maps in this area needs great caution.]

Diary page 128.—From Angordya downwards for about 17 miles the water surface of the Ganges was half to three quarters of a mile wide in October 1764.

Diary page 131 to 133.—At Jockya, as has been noted already, the river bifurcated. The Eastern branch was the larger, but divided into several channels; of these Rennell explored the most Easterly in November and December 1764, passing out of the main river West of Mendygunge, by the Creek of that name which is described in Chapter IX page 47. Rennell found the river perennially navigable [or he would have tried alternative routes].

Navigation Map.—This map shows the whole of the Eastern channel as one river and as perennially navigable, [and, in colouring up Map XI I have followed the Navigation Map. It has been seen already that the Western branch was strongly tidal and the tides alone in this area therefore would permit of perennial navigation].

Section IV.—Minor branches of the Ganges.

23. All those minor branches which fall East of the Ganges (Section III) are described in Chapter IX, page 47, and those on the West as far down as the junction of the Comer with the Buderation Creek (Hobbygunge) are described in Chapter XII, page 58.

There remain only the branch from the Comer to the Western Channel of the Ganges at *Sallaputty* and the Creek which ran due South from the Western branch to *Burrysol**.

Navigation Map.—Both these Creeks are shown in the Navigation Map as perennially navigable.

Diary page 135.—The Western Creek is said to be a large Creek, but there is no further information available about the Southern Creek. [Both, however, were in the tidal area (see description of Western Branch of the Ganges above, which was *strongly* tidal); I have therefore accepted the evidence of the Navigation Map.]

* The Creek between Rottinpour and Burrysol is described with the rivers of Map X B in Chapter XI, page 48.

PART II.

Brahmaputra River.

24. This river is described in two sections, as shown below, preceded by some general remarks :—

Section I.—From above Goalpara to Chilmari (Map VI B).

Section II.—From Chilmari to the junction of the Brahmaputra and Megna Rivers (Map VII A).

The Brahmaputra loses its name at the end of section II; for descriptions of reaches below that point, see description of River Megna (Part III of this Chapter, page 21).

General Description.

25. *Memoir Pages 276-277*.—Rennell was the first observer to point out that the Brahmaputra, as we know it in the plains, was the real continuation of the Sangpo of Tibet—although du Halde had previously suspected that the two rivers were really one. Rennell made his discovery, or more properly propounded his theory, in 1765. Rennell considered the Brahmaputra to be a larger river than the Ganges. His actual acquaintance with the Brahmaputra (Burrampooter) did not extend further up-stream than 21 or 22 miles above Goalpara (Map VI B).

(*Diary Page 157*).—From that point he has described the Brahmaputra in some detail downwards, until it lost its name (Map VIIIA) at its junction with the Megna River from Sylhet.

Atlas Plates (25 to 21).—The course of the river described above was surveyed by Rennell on the scale of 2 inches to 1 mile, upon the five Atlas Plates mentioned. These Plates respectively show the course of the river down-stream, and they may be consulted in any special investigation requiring larger scale maps than those which illustrate these notes. Before such use, however, the reader is referred to the remarks made about these maps below.

Maps VIB, VIIA and VIII A.—Starting from above Goalpara and working down-stream, the course of the river from above Goalpara to the Megna is shown in Maps VIB, VIIA and VIII A. [From these it will be observed that the main course of the Brahmaputra in Rennell's time, was very similar to its course to-day as far as, and for some distance below, Chilmari.] Thence the river followed the Eastern side of the old alluvium known as the Madhupur Jungle and passing Mymensingh, eventually reached the Bay of Bengal through what is now known as the Megna River. [Since Rennell's time these reaches of the Brahmaputra below Chilmari have become subsidiary, and the main water of the river now passes to the West of the old alluvial area, and meets the Ganges near Jaffiergunge (Goalundo) and its immediate neighbourhood. The date of this change is not known with any certainty. But it appears to have been known by Rennell in 1788.]

Memoir Page 53.—"I have in another place* taken occasion to observe that the Cosa River (Map IV) changed its place of confluence with the Ganges, which is now 45 miles higher up, than it was. The Burrampooter has varied its course still more."

[It appears therefore that in 1788, Rennell knew of the opening up of what is now the Jamuna River, which carries the main water of the Brahmaputra down the Western side of the Madhupur Jungle (old alluvium) to Goalundo; but unfortunately I have not been able to obtain a copy of the Philosophical Transactions referred to in the footnote below.]

Memoir Page 252.—Rennell states that in 1781 in the Philosophical Transactions he published an *Account of the Ganges and Burrampooter Rivers* and this account he included in his *Memoir of a map of Hindoostan*.

* Philosophical Transactions LXXXI, page 99.

Memoir Pages 255-24.—He refers to the changes in the Cosa River but not to the Brahmaputra River and it would appear that between 1781 and 1788 he had heard of the adoption of the Jamuna Channel by the Brahmaputra; and this supposition seems reasonable since several writers have concluded that the great flood of the Tista River in 1787—when the Tista is said to have deserted the Ganges and thrown its water into the Brahmaputra near Chilmari—was the cause of desertion of the Mymensingh Channel and the adoption of the present alignment of the bed of the main Brahmaputra.* In the descriptions below I have started as far up-stream as Rennell explored and have assumed that the whole bed of the river was navigable from that point downwards. As will be seen later the evidence is that the river was perennially navigable through the whole length examined by Rennell, but he has left no information as to which alternative channel at any place was the channel most used; it is more than probable that in some places the main channel only was perennially navigable.

Section I.

Goalpara to Chilmari.

MAP VII B AND ATLAS PLATES 25 AND 24.

26. Water Routes and Navigation Map.—The River was always navigable from the highest point reached by Rennell downwards; but as the perennially navigable channel is not specified, I have shown the whole bed—including its islands—as navigable. To discriminate would be misleading.

Diary Page 157.—The navigation of the river seemed as easy as that of the Ganges, but there were rocks, in places, in the river-bed, from Dubarye (Dhubri) upwards.

Diary Page 156.—Between Goalpara and Rangamatti the breadth of the river was very variable, and its bed studded with islands.

Diary Page 157.—The seasonal rise (from lowest to highest water) was about 32 to 33 feet near Goalpara.

Navigation Map.—The River from Rangamatti to Dabarye (Dhubri) was always navigable, but the cross-channel from Rangamatti, South-East to the Brahmaputra, was only navigable for a part of the year.

Atlas Plate No. 25.—On the South side of the river opposite Doodkoar Hill a large Creek is shown as a “Creek during the wet season” but its navigation is not mentioned.

Diary Page 148.—The current at Chilmari between 19th and 25th June 1765 ran 6 miles an hour.

Atlas Plate No. 26.—About 8 miles above Chilmari the Tista Creek entered the main river opposite Pootya Island. The bed of the main river appears to have been carefully surveyed here.

Diary Page 159.—The Luheet (Lohit) River left the Brahmaputra on the north bank “three days above Goalpara” and joined the Bonaash (Manas) River, by the branches above Jogighopa. La Touche remarks, in a footnote—“The Lohit is the name given to a branch of the Brahmaputra much further to the East, separating the Districts of Sibsagar and Lakhimpur. It is interesting to find the name applied to a branch lower down the river and suggests that these branches represent an old course of the river.”

[It is for consideration whether the name Brahmaputra is not a comparatively new name, and the Lohit the original name at any rate in what is now known as the Province of Assam.]

The Lohit was navigable for Pulwars, or small boats, throughout the year.

*I am aware that this is contentious ground. But being unable to verify Rennell's reference to change in the course of the Brahmaputra in the Philosophical Transactions, I have had no option but to analyse Rennell's statements from such details as are at my command at the moment. So far as I can ascertain Rennell has left no information beyond that referred to above, regarding any great change in the course of the Brahmaputra.

Road Routes.—Ferries existed at Goalpara, Jogighopa, Doodkoar and Rangamatti, and Chilmari; and no fords are shown anywhere.

Luheet } See Brahmaputra Section I Map VIIB.
Lohit }

Memoir Page 277.—In 1765 Rennell showed that the Sangpo in Thibet was the upper portion of the Brahmaputra, the final proof of which deduction was only forthcoming a few years ago.

Atlas Plate 23.—Near Baigonbary (Southern edge of Plate 23) there is a remark "End of Particular Survey". The details on Atlas Plates 24 and 25 must not be relied upon closely, they being partly surveyed and partly sketched.

Section II.

Chilmari to the Megna River

MAP VII A AND ATLAS PLATES 23 AND 22.

27. Water Routes and Navigations Map.—See first remark under Section I of this river. I have shown the whole bed of the river as navigable in Map VII A.

Atlas Plates 23 and 22.—Plate 23 is not an accurate survey, but Plate 22 can be relied upon. [See last note under Section I of this river above.]

Atlas Plate 23.—The river rounds the Western corner of the Garo Hills and passes Dewanganj, which is about half way between Chilmari and the place where the Brahmaputra broke through towards Jaffiergunge (Map VII A) at some later date. This movement sent the main river down a channel between Seampur and Compopour on Atlas Plate 23. It will be observed that this Creek, then the Jenai River [and later the Jamuna River (Main Brahmaputra)] was practically dry in October and November 1765, when Rennell made Atlas Plate 23. But it must be remembered that Atlas Plate 23 does not purport to be absolutely accurate and the width of the offtake of the channel is so great (about 2 miles) that one suspects that it may have led to a somewhat more important stream than the miserable trickle which Rennell shows. I admit that the actual change in course of the Brahmaputra may have passed down the larger branch of that river which lay between Dewangunge and Compapour, and thus cut through into the Jenai. But since these notes only aim at recording facts as Rennell found them the relevance of the explanation introduced here will be obvious to the reader. It will be noticed that although Atlas Plate 23 shows the Jenai as negligible in 1765, Map VIIA shows it as a somewhat important stream. The latter map was based on surveys made between 1768 and 1771 and therefore should be relied upon in preference to Atlas Plate 23. Lastly an examination of Map XII will show that in Rennell's time navigation was possible for a part of the year, through the Jenai River, down to Jaffiergunge (Maps VIIA and XII). [Thus, as early as 1771 anyhow, the way was prepared for the great move which threw the main course of the Brahmaputra from the Eastern to the Western side of the Mādhupur Jungle Tract.]

Memoir Page 53.—The edition of the Memoir used by me was published in 1788. The Cosa (Kosi) River had moved its confluence with the Ganges 45 miles up-stream. "The Burrampqoter has varied its course still more." From this it may be argued that between 1771 and 1788 the adoption of the Jenai Channel had made considerable progress, even if the actual main change in channel was not fully established. It is only this main change that Rennell can have referred to [for it is the only great change that has occurred to the Brahmaputra since 1764, when Rennell first came to Bengal*].

Navigation Map.—Both the editions of this map dated 1781 and 1792 mark the Jenni (Jenai) River Head, and obviously it was a point of importance as very few names are entered on the Navigation Map.

*See remarks already made in the general description of the Brahmaputra River, previously to the description of Section I.

Diary Page 147.—From Dugdugga village, on the left bank, some ten miles above Toke, a creek *ran out of the Brahmaputra* towards the North-East. The direction of flow of this stream is abnormal. See “Dugdugga Creek,” (Chapter VIII, page 43). The bed of the Brahmaputra was from half a mile to three miles wide between Byganbarry and the Luckya River head, the breadth being very unequal.

Road Routes.—There were ferries at Byganbarry, Cassergunje, Osunpour, Agarasonda and Bajitpoor. [The last named ferry was probably near Cuttyadee.] The river is nowhere shown as fordable.*

Map VIIIA.—The change of name from Brahmaputra to Meghna is clearly shown on this map, and is referred to in greater detail in the description of the latter river†.

Map VIIA and Map VIIIA.—The Luckia River flows out of the Brahmaputra Southwards from below Toke; its alternative name was the “Little Burrampooter”. This river joins the Banar River near Simulya, and afterwards, below that place, throws off a branch which passes Perralyah, after which it again bifurcates, one stream passing to the Meghna at Nursingdy, and the other (Burrampooter Creek—Map VIIIA) running parallel to the Luckya, until it reaches the Dhaleswari River just below Naraingunge.

Thus we find the name Burrampooter, or Brahmaputra, perpetuated, by minor channels, down to the very point at which an old channel of the Ganges, and the Brahmaputra, are thought to have met.

Memoir Page 265.—“With an equal degree of probability (savoured by tradition) we may trace its (Ganges) supposed course to Dacca, to a junction of the Burrampooter or Megna near Fringybazar; where the accumulation of two such mighty streams probably scooped out the present amazing bed of the Megna.

[I will not pursue this subject here, but will merely ask the reader to bear in mind the facts noted above as they will be referred to in greater detail under the description of the Megna River.]

PART III.

Megna River.

28. This river is described under three sections:—

Section I.—From Curiel (junction of the Soormah and Brack Rivers Map VII B) to Sunerampour (Map VIIIA). The Megna joined the main Brahmaputra near Sunerampour.

Section II.—From Sunerampour to the junction of the Megna and Issamutty Rivers.

Section III.—Thence to the sea.

Section I.—From Curiel (junction of the Soormah and Brack Rivers, Map No. VIIB) to Sunerampour (Map No. VIIIA).

29. **Navigation Map and Water Routes.**—The main channel for the whole of this section was always navigable, down to Debpur Ghat where the river bifurcated, the two channels again meeting at Sunerampour. Both these channels were always navigable.

Diary Page 196.—The Western channel at Sunerampour was about half a mile wide about mid-June 1765, but must have been much smaller in the dry season.

*A ford occurs over the Burrampooter Nadi (Road Routes, page 42) which must not be confused with the Burrampooter River.

† It is described immediately after the Brahmaputra.

Section II.—Sunerampour to Callypour (opposite junction of Issamutty and Meghna Rivers—Map No. VIIIA).

30. Navigation Map and Water Routes.—The river left Sunerampour in two channels, the minor channel (East of the main channel) rejoining the latter some three miles above Corallya. This minor channel was generally used for navigation and was always navigable.

Diary Page 146.—At the junction near Corallya the minor channel was about half a mile wide and its water was clear in June 1765.

Navigation Map.—The main river for the whole of this section was perennially navigable.

Diary Page 145.—Tides were perceptible in June 1765 above Nursingdy but were not felt above Pikarchoar (on the Creek which joined the Meghna at Nursingdy).

Navigation Map and Diary Page 145.—The Nursingdy Creek mentioned above was always navigable and was most generally used in preference to the main Megna for the route Nursingdy-Bassimabo (Northern end of this Creek). On the right bank of this Creek hard red soil and, in some places, steep red cliffs occurred. The positions of these patches of old alluvium have been marked on Map VIIIA being taken from *Atlas Plate No. 21*. That plate shows the courses of this Creek and of the Megna (both branches) for the whole of this section of the river. The scale is 2 miles to 1 inch, but from Nauldee to Collypour another special map occurs (*Atlas Plate No. 20*), showing the main river on the scale of 2 inches to 1 mile. Both these maps were accurately compiled. At Corallya the Megna again bifurcated. On the East we find the Little Megna which rejoined the main river at Daoudnandy.

Navigation Map and Water Routes.—The Little Megna was always navigable.

Diary Page 144.—The Little Megna “affords shortest passage from Allynnya to Silhet, etc.”. Allynnya is near Daoudnandy.

Diary Page 146.—The Little Megna was “a large Creek”.

Diary Pages 145 and 146.—Between Nursingdy and Nauldee, on 17th May 1765, Rennell found the main Megna to be $2\frac{1}{2}$ miles wide in places, rapid, dangerous and full of islands and shoals. Page 146 of the Diary however gives the maximum width of the river between Nursingdy and Allynnya as 3 miles.

Road Routes.—Ferries were maintained at Nursingdy and Allynnya.

Section III.—From the Issamutty—Megna junction to the sea (Map VIIIA and VIIIB).

31. Atlas Plates 18, 17, 16, and 15.—This Section of the river is shown on four special maps, accurately drawn to the scale of 2 inches to 1 mile. Plate 15 extends Southwards to some 10 miles below Luckipour.

It was in this Section of the river that the main Ganges and Megna were connected by a number of Cross Channels which are shown on maps Nos. VIIIA and VIIIB. But it should be observed that the main waters of the two rivers never actually merged inside the delta face, and that in Rennell's time, beyond side connecting channels, these two capital rivers found the sea independently of each other.

Map VIIIA.—From the Northern end of this Section of the Megna River its bed suddenly widened out to an extent which attracted Rennell's attention. He remarked that tradition placed Dacca, at some previous time, in the main Ganges and that the “amazing” bed of the Megna* below the Issamutty junction could only be accounted for by the conflux of two very important rivers, only one of which existed, in this area, in Rennell's time. Thus we find, by

* See description of the Brahmaputra River (Section II, page 18).

Rennell's map, that the main Megna had increased from a width at Allynya of less than one mile, to a width of about five miles below Nursingpour (*Atlas Plates Nos. 18 and 20*).

Diary Page 134.—At Luckipour in December 1764, Rennell found the water surface of the main river 5 miles wide, and in January 1765 found the whole bed $7\frac{1}{2}$ miles wide.

Road Routes.—There were ferries at Chandpour and Luckipour. No fords are recorded.

Navigation Map and water Routes.—The main river was always navigable and the water route to Chittagong passed down the lower part of the main Meghna, thence across the Delta face North of Hathia Island, and between Bominy and Sundeeep Islands to the Eastern edge of Map No. VIIIB.

Map XB.—On Map XB will be found some soundings of the main river and its Western branch (past Little Backergunge) from Luckipour to the sea. The soundings are in fathoms at low water.

PART IV.

Bhagirathi and Hooghly Rivers.

32. *Maps XIIIB and XI.*—The Bhagirathi river falls in two separated parts; the Northern part left the Ganges near Rajmehal (Rajemal) on Map XIIIB* flowed Eastwards till it met the high land South of Malda (Mauldah) and then Southwards, along the edge of that high land to Pookarya, and [possibly] still further South, past Seebgunge to the Ganges. During these courses the river is shown by Rennell as the Cuttaha or Bogrutty River. On the South bank of the Ganges the same name (Bogrutty) re-appears and the river follows a winding course past Sooty and Moorshedabad to Cutwa; thence its course to its junction with the Jellinghy is shown on Map XI; south of this junction the joint rivers go by the name "Hooghly" [which is generally accepted to be a name of modern production].

The take-off on the South bank of the Ganges from that river to Sooty, as in other cases of spill channels from the Ganges, is in a direction contrary to the stream of the Ganges at the point of egress.

[The inference from Rennell's maps is that the Bogrutty, or Bhagirathi, has been beheaded by the Ganges, and this case with such others as I have noticed, is dealt with separately under the head of "Beheaded Rivers" in Chapter XXI, page 96.]

Bhagirathi (Section I).

Rajemal to Seebgunge.

MAP XIII B.

33. **Road Routes.**—These show the river as fordable at Hawasconna and Maddapour, both places being near the South-West corner of the ruins of the City of Gaur.

Navigation Map and Water Routes.—These give no information regarding the river from its off-take from the Ganges near Rajmehal (Rajemal) to the village of Caagmar. But they show the river as navigable for a part of the year from that place down to the Ganges (opposite Sooty).

Memoir Pages 265 and 55.—Gaur once stood on the left bank of the main Ganges; in Rennell's time the distance of the Western limits of Ruins of Gaur varied from 4 to 12 miles from the main stream of the Ganges. The river flowing past Gaur was navigable for a part of the year in Rennell's time. The change in course of the Ganges is dealt with in my description of that river (Chapter IV, Part I, page 11, and in that of the Kosi River (Chapter V, page 32).

* The junction North-East of Rajemal is more clearly shown on Map IV.

Bhagirathi (Section II).

From the Ganges River to Nadia.

MAPS XIII B AND XI.

34. Navigation Maps and Water Routes.—These show the river from the Ganges down to Nadia, as only navigable for a part of the year.

Memoir Page 259.—Below the Ganges (*i.e.*, as far down as Nadia) the river was “commonly” dry from October to May.

Memoir Page 265.—The Mootyjl (Motijhil) at Murshidabad represented one of the wanderings of the Bhagirathi.

Diary Page 14.—Where the Bhagirathi joined the Jellinghy (near Nuddyah or Nadia) on the 12th May 1764, the width of the former was not above 50 yards, and the river was *said* to be navigable, upwards, for medium sized boats.

Road Routes.—(*Map XIII only*)—There were fords at Sooty; and just below Sooty and Cutwa (Katwa); and ferries were maintained at Jungipour, Moorshedabad and Cossimbazar (4 ferries). [It will be observed that the ferries only existed at important commercial points.]

Memoir Page 270.—The Bhagirathi was embanked for 70 miles at enormous expense, to stop inundation. “It is calculated that the length of these dykes collectively [for the whole of Bengal] amounts to more than 1,000 English miles; some at the base being as thick as ordinary ramparts.”

When the Bhagirathi was full of water “passengers in boats look down on the adjacent country, as from an eminence.”

Memoir Page 260.—Between the Bhagirathi and Jellinghy Rivers a line called “Mr. Call’s Line” will be found on Maps XI and XIII B. The general fall of country, from North to South, along this line, was 9 inches to 1 mile, after due allowance was made for curvature. But owing to the windings in the river bed the fall in it was reduced to 4 inches per mile.

[It is not clear to which of the two rivers this refers, but most probably to the Bhagirathi.]

Hooghly River.

Section I—Nadia to Calcutta.

35. Map XI.—This river commenced at Nuddyah (Nadia) at the junction of the Bogrutty (Bhagirathi) and the Jellinghy Rivers. Thence it flowed Southwards past Calcutta to the sea.

Road Routes.—There were ferries at many points, but no fords are recorded.

Navigation Map and Water Routes.—These agree that the river was always navigable.

Water Routes.—Tides extended up the river probably to near Nadia. (*See Tides—Chapter XVIII, page 90.*)

Memoir Page 259.—The Churnee River [Mathabangha] entered the Hooghly on its left bank near Bullagurry, but was not considered by Rennell as an affluent to the Hooghly of sufficient importance to mention. He considered that the fresh water supply to the Hooghly came from the Jellinghy and Bogrutty (Bhagirathi) Rivers.

Section II—Calcutta to the Sea.

36. Map XA.—This map merely shows this section of the river in outline. A better view of it and its surroundings is shown on Map XIV B.

Road Routes.—These show ferries at various points but no fords.

Navigation Map and Water Routes.—These agree that the river was always navigable; but the water routes, being routes of inland navigation, do not extend further South than Channel Creek.

Memoir Page 59.—The Hooghly was navigable for the largest ships which visited India.

Memoir Page 259.—The Hooghly was the only “branch of the Ganges that is commonly navigated by ships”. [Here Rennell refers to the main estuary rivers of the Delta as branches of the Ganges.] Navigation was difficult in the lowest part of the Hooghly River, not from lack of water, but in tracing the channels between sand banks which projected far into the sea.

The exit to the sea was the deepest of all the main estuary rivers, and the quantity of Ganges water discharged down the Hooghly was only computed at one-sixth of what was discharged through the main mouth of the Ganges at the sea face.

Map XA.—It will be observed that the Channel Creek is shown as the main exit from the Hooghly towards the Sundarbans, and that the “Rangafullah Creek, or old passage” was no longer of any importance.

No other information is forthcoming regarding the Hooghly River.

PART V.

Tista and Attrai Rivers.

37. In this part I have described the Tista and Attrai Rivers as one stream; [this is not really inconsistent, because it is probable that the reaches described as the Tista occupied an original upper bed of the old Attrai (Attri)].

The joint rivers are described in three sections:—

Section I—From the Himalaya to Consumagunge (Map VI A).

Section II—From Consumagunge to Kistapour (Map V), where the name Attrai commenced.

Section III—The Attri, Arti or Attrai River from Kistapur (Map XII) to the Ganges near Rottingunge.

Section I is preceded by some general remarks on the [joint] River.

Teesta and Attrai Rivers.

38. The courses of this [joint] River in Rennell's time may be followed downwards from the North-East corner of Map VI A, through that Map to Consumagunge, which is also shown on Map V. Below Consumagunge on the latter map the river broke up into a succession of channels which surrounded Dinagepour. Below Dinagepour two main channels emerge; namely, the Purnabubah which flowed into the Mahananda at Iyoe and Rohanpour; and the Attri (Attrai), which proceeded almost due South to the Southern edge of Map V; but breaking up into two streams below Limbobarya. Of the two main streams emanating from Dinagepour, the Attri was the more important; [but by Rennell's time below Limbobaraya it had suffered much mutilation at the hands of other rivers]. On Map XII what may be the original course of the Attri may be followed past the following places:—

(i) *Limbobarya to Bandicora*—in two main channels; a third ran West and then South from Limbobarya itself, and ultimately joined the Attri, East of Nattore (Barally River).

(ii) *Bandicorra to Budgerapour* (Gaur or Goor Rivers).

(iii) *Budgerapour to below Gubindpour*. Again known as the Attri.

(iv) *Thence to seven miles above Chatmol* by two minor channels which are marked Attri in red on the Map. These names have been taken from other maps by Rennell.

(v) *Thence to four miles East of Syghpyne* by a channel marked similarly *in red* from Rennell's other records.

(vi) *Thence by a channel known as the Seegnee River to Dulowry.*

(vii) *From Dulowry an unnamed Creek ran South and joined the Pabna-Rotingunge Creek below Boolbaria.* This latter Creek is called elsewhere, by Rennell, *the Arti River*, which passed out into the Ganges below Rottin-gunge. [Thus, with tolerable certainty, we can trace the old course of the Teesta from its egress from the Himalaya to the Ganges; and, although in Rennell's time the streams which I here describe together did not always carry the main water of the Teesta, I have thought it best to maintain the older channels as the basis of description of the river.]

Teesta River—Section I.

From the Himalaya to Consumagunge.

MAP VI A.

39. Navigation Map.—This Map shows the Teesta as navigable always from Jelpigory (Jalpaiguri) downwards.

Road Routes.—Ferries occurred at Jelpigory, Jarbarry and Consumagunge. The river is nowhere shown as fordable below Jelpigory; above Jelpigory no information is forthcoming about this River.

Diary, pages 171-172.—The rapids near Allygunge stopped navigation in the dry season. Rennell heard the sound of these rapids from Umerconnah, some 5 miles North of the rapids, in February 1766, a South wind blowing at the time. Rennell was informed locally that the fall was four feet, and the cascade 150 yards broad.

Diary, page 167.—At Dewangunge below Allygunge, in January 1766, the river bed was one to one and a quarter miles wide. The water was then 300 yards across, and from four and-a-half to ten and-a-half feet deep. The stream was not very rapid and the water was very clear. The river bottom consisted of sand and pebbles.

It will be observed that the evidence regarding the navigability of this river is contradictory. In Map VI A I have followed the Navigation Map except at Allygunge, where the falls occurred. [The evidence seems to point to permanent navigable conditions above and below Allygunge and a block at that place for a part of the year.]

No tributaries entered the Teesta on its left bank, but a number of effluents carried water off from the main river either to the Ganges or the Brahmaputra.

Teesta Creek and Teesta Nala.*

40. From North to South the first of these effluents was the Teesta Creek, which took off about nine miles below Jelpigory; after a course of four miles it divided into the Teesta Creek and Teesta Nala, the latter joining the Creek again at Gowragot having changed its name first to the Coolnee River. From Gowragot these united streams were known as the Goggott River for about 10 miles, when another bifurcation occurred, the Goggot running Southwards to Rungpour, and the Teesta Creek flowing South-East towards Chilmari; from Calligunge to Chilmari, however, the Creek assumed the name of Teesta River. The name Teesta therefore occurs throughout, from the main Teesta to the Brahmaputra except for the short length between Gowragot and Sunagur, [where the name Goggot suggests the development of the Goggot at the expense of the waters of the Teesta Creek and Teesta Nala to the curtailment of the life of the two last named rivers. The Teesta

* Detailed descriptions of these streams will be found in Chapter VII, page 37.

Creek is important since it was its general alignment which was taken up shortly after Rennell's time in India, by the main Teesta when the latter discarded its North and South channel through the Southern half of the map VI A and threw its main waters towards the Brahmaputra].

From Courtin's Fort on the main Teesta, a second important effluent left the main river and later on took the name of Sanalkotta Creek, which name it retained until Buddelgunge (Southern margin of Map VI A). There it assumed the name of *Teesta River* ultimately (Map V) becoming the Curratty (Karatoya) River. After further changes in name the water of this river—or a great part of it—fell into the Dhaleswari River near Jaffiergunge.

Teesta River—Section II.

41. This river has been described as far South as Consumagunge under Section I. Section II follows the river as far South as Kistnapur, which is on the Southern margin of Map No. V, at the junction of the Attrai (Attrai) and Jabuna Rivers. The Jabuna took off from the Teesta a few miles above Consumagunge and thence followed an independent course to Kistnapur.

Map No. V.—The main river bifurcated some five miles below Consumagunge, the Western branch following two sides of a triangle with the town of Dinagepour at the apex. The Eastern branch met the Western branch above Sumdya but threw off a network of rivers which were confined inside the triangle referred to above.

The Western branch gave off some contribution of water to the Purnabuba River at Dinagepour, but that river may be considered independently of the Attrai.

After the junction of the Eastern and Western branches above Sumdya, the River followed a straight course to Limbobary, above which place a minor channel led water to the Comerung Jeels.

Below Limbobary the river again bifurcated into two channels which met at Kistnapur, where the main river was reinforced by the Jabuna.

Navigation Map.—This map shows the river as perennially navigable throughout from Consumagunge to Kistnapur, including the three sides of the triangle round Dinagepour and the two main channels between Limbobary and Kistnapur.

Water Routes.—The Water Routes do not show with certainty how far the channels were navigable all the year round.

Navigation Map.—The channel inside the Dinagepour triangle from Sunderboun to Dinagepour is shown as only navigable for a part of the year.

Road Routes.—Ferries are recorded at Consumagunge, Dinagepour, Sumdya, Baloogaut, Conchon, Maddapour and Bandicurrah. No fords are recorded.

Diary, Page 184.—The Diary describes the river between Baumanparah (above Maddapour) and Kistapour in the following words (December 1776).

“At Baumanpara the river is 300 yards broad and sufficiently deep; about 12 miles below this place the river changes its general course from South to South-East and at the same time separates into 2 channels, and the North-West of these again into several others. By the waters being divided into so many streams it happens that none of them are navigable for boats of 2 cubits draught of water. This shallow place is at Kalcour* 4 miles above Bandegotta.† At Bandegotta the two principal channels join again. The country round this place is an entire swamp.”

This extract makes it clear that the Southern branch of the river was not perennially navigable for 300 maund boats at a point about 4 miles above Bandicorrah, and that the Northern channel was of less importance than the Southern.

* Not marked on Rennell's map.

† Bandicorrah on Map No. V.

As regards the former channel Rennell only says that there was one shallower place. [I have thought it best to show a block in the Southern channel at Kalcour, and to show the Northern channel as only navigable in the rains.]

The block in the Teesta (Map VI A) at Allygunge is not shown in the Navigation Map, [the scale of which is far too small to admit of such an item being shown. The same remark applies to the block referred to here].

Attrai River—Section III.

42. *Map XII.*—An examination of this Map will show that I have entered in red Attri or Arti River in certain lengths of rivers unnamed in Map XII. In each case these red additions are taken from other maps by Rennell [and probably the only reason why Rennell omitted to use the name Attri more frequently on Map XII was that he had to generalize in compiling that map]. Rennell appears to have made no study of the nomenclature of rivers in the confused area of water channels between Jalpaiguri and the Ganges.* [If Rennell had made such a study, doubtless he would have left information of great value now, for in any consideration of the relative ages of these rivers, which naturally is a very important factor in the earlier Physical Geography of Bengal, early nomenclature should be of much help.]

In Section II this River (Tista-Attri) has been described as far South as Kistapour, at the junction of the Attri and Jabuna Rivers. Thence the old channel can be followed on Map XII past Badgerapour; Gubinpour; Chuppalyah; to the South West of Chatmol; Sighnpine; Boobariah and Sindree; to the Ganges River.

On the West of the course of the river as described above, the river system is comparatively simple. The Barruly, Narrud, Burreyl fall normally into the Attri; and the Pabna Creek falls similarly into the Arti or Rottingunge Creek.

But East of the Attri, from Badgerapour downwards along the line of the very lowlying areas shown upon Map XII, we find great confusion of rivers and river names, [which suggest that the depressed area was depressed at some time after the Attri—which is known to be a very ancient river for an area like Bengal—had been thoroughly established in the general course that I have followed].

Navigation Map and Water Routes.—Certain lengths of the river were navigable perennially, as will be observed from Map XII :—

- (i) For some miles below Kistapour (junction of Attri and Jabuni Rivers).
- (ii) For some miles North and South of Gobinpour.
- (iii) For a short distance some miles East of Syghnpine.
- (iv) From Boolbariah to the Ganges.

Similarly, for the lengths marked on Map XII as navigable for a part of the year, the Navigation Map and Water Routes agree.

For the other lengths of the river no navigation information is available.†

Road Routes.—Ferries existed at Autlunka, Chuppalyah, Gobinpour, (2 ferries) and Bellua. No fords across the river are recorded, except one at Syghnpine, where the river was not shown in the Water Routes as navigable perennially, or even for a part of the year.

(*Diary, pages 126 and 182*).—The mouth of the river (near Rottingunge) at the junction with the Ganges, was about 500 yards “over” on the 1st October 1764 and the Creek was always navigable for the largest boats through to Pubna. It was used in preference to the main stream of the Ganges although the latter was 10 miles shorter. In November 1766 the Creek varied from 150

* That Rennell did not do so was deplored by Montgomery Martin.

† [Portions of the routes referred to above are not shown on the Navigation Map, its scale being too small to admit of them being shown.] There is no contradiction, however, between the Water routes and the Navigation Map.

to 300 yards wide, and was very serpentine. By the river the distance from the Ganges, near Rottingunge to Pubna was 53 miles, against a direct distance of 28 miles. The bed had few sands in it.

Diary, Pages 181 and 182.—Here Rennell constantly refers to the river as the Arti, which La Touche thinks may have been misspelling for Attri, as the Creek is still known as Attrai in some places.

Memoir, Page 272.—"The Teesta is a large river which runs almost parallel to the Ganges for near 150 miles. During the dry season, the waters of the Teesta run into those of the Ganges by two distinct channels, situated about 20 miles from each other; and a third channel at the same time discharges itself into the Megna. But during the season of the floods, the Ganges runs into the Teesta, whose outlet is then confined to the channel that communicates with the Megna. This alone is sufficient to show how trifling the descent of these rivers must be, whose courses are thus regulated (not by the declivity of their beds but) by their heights in respect to each other; which like the flux and reflux of the tide, have the effect of giving contrary directions to the stream, at different seasons."

[It is difficult to follow Rennell in the statements made above.] By Rennell's own maps the Ganges received Teesta water through the following channels:—

- (i) Tangan River, by the Mahananda (Map V).
- (ii) The Puranbubah River through the Mahananda.
- (iii) The Burrely River through two minor channels near Rampur Bauleah (Map No. XII).
- (iv) The Pabna-Rottingunge Creek—and by the same maps the Megna received:—
- (v) Any distribution which reached the Dolloserry River East of Jaffi-erunge (Map No. XII and VIII A).
- (vi) Water from the Teesta Creek to the Brahmaputra and thence to the Megna (Map No. VI A).

It is obvious that item (V) above refers to the channel which took a part of the Teesta water to the Megna in the dry season, and much in the rains, *viz.*, the Dollaserry River. [But the two entrances to the Ganges in the dry season can only have been the Pabna-Rottingunge Creek, which cannot have run in two different directions.]

Water Routes.—Route No. 91 shows the Rottingunge Creek as running from Pabna towards Dacca.

[It would appear that in the lapse of time that occurred between the making of his last detailed map (*Atlas Plate No. 56*) of this area (1775), Rennell had lost touch somewhat, and assumed, in 1788, when he wrote what I have quoted above, that the Teesta [Attri] water from Boobberiah passed partly towards Pabna and partly towards Rottingunge (*Map No. XII*).

The fact remains, however, that between 1764—1776 Rennell noted that the Ganges in flood tended seriously to hold up distributaries from the North and to push their waters in the direction of the Chalan Beel and its associated depressions.

PART VI.

Karatoya, Foolju and Boodussey Rivers.

43. [The Karatoya River seems to have been cut in two by the main Teesta of Rennell's time. The evidence on this point will be found under Corto River (Chapter VII, page 37 and under Karatoya River in Chapter XXI—Beheaded Rivers—page 96).

Here I have only described as the Karatoya (Curratty) the reaches from the main Tista (Map V) Southwards, to the junction of the Karatoya and

Foolju Rivers (Map XII).* For convenience of description of the Rivers on Map XII (Chapter XIII), I have arbitrarily assumed that the Foolju and Boddussey Rivers† (Map XII) are the prolongation, to near Jaffiergunge (Goaltundo), of the Karatoya.]

Karatoya (Curratty) River.

Section I—Reaches North of Seerpour.

44.—This river enters Map V from the North in three branches :—

- (a) The Curtya River which leaves the Teesta, under the name of Curcurry River (Map VIA), and joins the upper Curratty River below Coosugarrya on Map V.
- (b) The " Teesta River " which is a continuation of the Sanalkotta Creek (Map VI A).
- (c) The Curta River which is an affluent of (b) above.

The Curtya and " Teestah Rivers " unite below Cossugarrya and form the Curratty River.

Before reading the description of this river, the reader is referred to my description of the Corto River (Chapter VII, page 37).

Road Routes.—The " Teestah River " was fordable at Hassiah and the Curratty at Maisenah; no further information is available about the reaches of the river above Goragot.

Road Routes.—Below Goragot the following fords and ferries are recorded :—

- Goragot—Ferry.
- Gobindgunge‡—Ford and Ferry.
- Seebgunge—Ford.
- Mustan—Ford.
- Buggurrah—Ford.
- Seerpour—Ford.

Navigation Map.—The river is shown as perennially navigable as far up as Goragot.

Water Routes.—From Seerpour to Goragot the river is shown as perennially navigable.

Diary, Page 184.—It is clear that Rennell left this part of the country rather in a hurry [and it is possible that his information regarding it is not reliable].

[I can offer no explanation of why this river should both be fordable and fit for perennial navigation. If the Water Routes had shown the route as perennially navigable by mistake, the situation would be cleared up. But the entry in the Water Routes is quite clear.

I have shown this river on Map No. X by the double navigation symbol from Seerpour to Goragot.]

Foolju and Bodussey Rivers—Section II.

45. *Map XII.*—Section I has brought this river as far South as Seerpour. South of Seerpour the river only maintained its name for a few miles.

[As stated already for convenience of description I have included here the Foolju and Bodussey Rivers as the Southern courses of the Curratty.

*Described as Section I of this Part of Chapter IV.

†Described as Section II of this Part of Chapter IV.

‡This crossing is shown in four places in the Road Routes, viz., on pages 126, 197 and 244 as a ford, and on page 12 as a ferry.

The main objection to this is that there is no certainty that these two rivers were really the prolongation of the Curratty. In fact they were probably not in prolongation of that course, as Rennell shows an "Old Curratty River" as almost joining the Foolju River at its southern end (Shazadpour). Any other course than that adopted by me would mean subordinating a historic river, and one of great old time importance, to a river which is less known and is probably of far more modern origin (Issamutty River). To describe the rivers in the vicinity of the swampy area which lies on Map XII is a task in which arbitrary measures seem to be permissible.]

Map XII.—The real Curratty River ended at its junction with the Calligong Creek, some 6 miles South of Seerpour. Thence the Foolju continued Southwards to Shazadpur, and there it was reinforced by the Cossi River. The combined rivers thus flowed through the jeels as the Budussey River to Jaffiergunge where they reinforced the Dollasserry (Dhaleswari) River.*

Road Routes.—Below Seerpour numerous ferries are recorded, but no fords between Seerpour and Jaffiergunge.

Navigation Map.—This map shows the whole course from Seerpour to Jaffiergunge as perennially navigable.

Water Routes.—These record the route but do not definitely refer to it as being navigable always.

Atlas Plate 56.—From Shahzadpour down to Jaffiergunge this Plate is more correct than Map XII.

* It will be noticed that the head waters of the Curratty have been traced back to the Teesta River (Map VI A) in Section I. Thus a part of the Teesta's water supply was diverted from the Ganges to the Dhaleswari in Rennell's time and flowed into the Megna.

CHAPTER V.

The Rivers of Map IV.

46. For descriptions of the Ganges and Bhagirathi or Cuttaha River, see Section (1) of special descriptions of those rivers, Chapter IV, page 11.

The other rivers dealt with in this Chapter are:—

Kosi (Coosee) including old channels; Mahananda, Balasan; Dunk or Doank; Nagore; Sudanny; Saraw; Culandry; Concor; Rontan or Dubelly; Connoy, and Little Connoy.

These descriptions are followed by some remarks upon changes in the courses of the Kosi, Ganges and Bhagirathi Rivers, [as suggested by Map IV].

Kosi (Coosee) River.

47. *Map IV.*—This river forms the Western boundary of the areas covered by these notes.

Navigation Map.—The river is shown as navigable throughout its length from Morung (Nepal Terai) to the Ganges, its course being practically due South.

Road Routes.—Ferries are recorded at Nautpour (Nathpur); Dhumah Ghat; Etrace; and Chandpour. No fords are recorded.

Map IV.—This map shows an old bed of the Coosee River as taking off at Carsai, and running between high banks to Maniahry; thence parallel to the Ganges until it joins that river opposite Rajemal (Rajmehal).

Another river of the same name (Coosy River) leaves the Ganges at Caragolah and joins the Old Coosee at Maniahry.

Navigation Map and Water Routes.—Both the Old Coosee and the Coosy River are shown as navigable only for a part of the year, as well as the channel between the Ganges River and Comillapour.

Road Routes.—The Old Coosee was fordable at Buckrah and Milkee which are respectively a few miles West and South-West of Purneah. (*Memoir, page 265.*) The Old Koossee bed shown on Map IV is an old main course of the Coosee River, which at some unspecified time moved its confluence with the Ganges (Rajemal) to Cuttry, 45 miles further up the stream of the Ganges. (*Memoir, page 53.*) This move is referred to as if it occurred suddenly and it may be noted that Rennell's Map IV shows no succession of channels on the North of the Ganges between the Old Coosee's mouth opposite Rajemal and Cuttry (*Map IV*).

Map IV.—The great changes that have occurred in this neighbourhood in the Kosi, Ganges, and Bhagirathi Rivers (when the last named river was the main Ganges at Gaur) for many years, have been a source of discussion and speculation. Rennell's Map IV, gives valuable information upon this point which is dealt with in "Beheaded Rivers", Chapter XXI; page 96; see also note at the end of this Chapter.

Mahananda River.

48. *Map IV.*—This river rises in the Bhutan Hills, and no information regarding it is available for the reaches above Sanashygotta; the course of the river South of Sanashygotta is shown on Map IV, from that place to Nabobgunge, near which it joins the Ganges.

The information regarding this river is conflicting, as will be seen from the notes below.

Navigation Map (*Memoir, page 35*).—By this map the River is shown as perennially navigable from Sanashygotta to the Ganges. The *Memoir*,

discussing the situation of Gaur, says:—"On the East side, and in some places within two miles, it [Gaur] has the Mahananda River, which is always navigable, and communicates with the Ganges." It will be observed that the Memoir does not state how far above Gaur the river was always navigable.

Diary, page 170.— $4\frac{1}{2}$ miles below Sunashygotia the river was about 120 yards wide in February 1766, and 2 to 3 feet deep. Therefore for those $4\frac{1}{2}$ miles, [and perhaps for some distance lower down], the river was not perennially navigable for 300 maund boats. Rennell followed the left bank of the river down to near Mahrajunge, but unfortunately gives no statistics of depth or width for this 50 miles of river; but he says that the river was considerably increased in that length of its course, being reinforced by various tributaries.

Road Routes.—These show fords at Sunashygotia, Mahrajunge and Nabobunge (near Malda); no ferries are shown above the last named place, although several important roads cross the river.

No fords are shown below Nabobunge (near Malda) but ferries are recorded at Sahebgunge, Malda, Gomashtapour, Dinagra, and Nabobunge, (near the Ganges).

A ford is also shown across the river Mahananda at Taujepour. That ford was actually over the Nagore River [which shows that mistakes occur in the Road Routes].

Map No. IV and Diary, Page 170.—The first tributary of the Mahananda below Sonashygotia was the Balasan River, which was nearly the same size as the Mahananda.

Diary, page 171.—The next main tributary below Sonashygotia was the Doank (or Dunk) which was about half the size of the Mahananda.

Road Routes.—Page 141 of the Road Routes shows at Maharjunge two fords; one over the Conkiand River and one over the Mahananda. [The entry is printed "fors" and the "o" might easily be a misprint for "e" when the entry would read "fers" or ferries.]

The ford at Nabobunge (near Mandul) is at a place where the river had divided into two branches, [both of which might have been fordable. This might have resulted in a temporary block in perennial navigation for a short distance]; the bifurcated channel here only existed for about three quarters of a mile, leaving the river perennially navigable [perhaps] below and above the block (*Map No. IV*).

A similar case of a block in navigation occurred in the Teesta River, (see description of that River, Chapter IV Page 26 at Allygunge). The evidence regarding the navigability of this river is not conflicting between the two places called Nabobunge; therefore on Map IV I have shown the river as perennially navigable for these reaches, [but above the upper Nabobunge I have shown both navigation symbols, the evidence being conflicting].

Minor Rivers of Map No. IV.

Balasan River.

49. This river entered the Mahananda from the North just below Titaleeah. (*Diary, Page 170.*) Rennell crossed it about $4\frac{1}{2}$ miles West of Cossimgunge and found it nearly the same size as the Mahananda which then was about 120 yards wide and 2 to 3 feet deep (February 1766). [The width apparently refers to the bed and not to the water surface.]

No other information regarding this river is available.

Dunk or Doank River.

50. This river is shown partly on Map VI A, and on Map IV. For convenience of description both sections are described here.

Map VI A, Road Routes and Diary, Page 169.—The Doank was fordable near Majell and at that place was about 90 yards wide and 2 feet deep in February 1766.

Map IV.—The river entered the Mahananda about $4\frac{1}{2}$ miles above Mahrajunge and was fordable there. It was about half the size of the Mahananda at the junction.

No other information is available regarding this river.

Nagore River.

51. This river is shown as taking off from the Dunk River South-East of Sunashygotia; (*Map No. IV*) it then flowed South by West till it met the Mahananda some miles above Maulda. The information regarding this river is contradictory.

Navigation Map.—The river is shown in this map as navigable always from the Mahananda up to Taujepour.

Road Routes.—Fords are shown at Churamond and Taujepour and at Peergunge (South-West of Seebunge). The first ford occurs in the length shown as perennially navigable in the Navigation Map.

[Since no other information is forthcoming, I have shown the river in Map IV as perennially navigable from the Mahananda to Churamond, and as doubtful from that place to Taujepour.]

Sudanny River.

52. **Road Routes.**—This river was fordable at Hidgeech between Taujepour on the Nagore River and Nabobgunge (near Mandal) on the Mahananda River; no other information regarding the river is available.

Saraw Creek.

53. *Navigation Map: Water Routes.*—This Creek joins Purneah to the Old Kosi river, and was navigable only in the rainy season.

Culandry Nadi.

54. This river connected the old Ganges-Kosi course from Luscarpour (South of Hyatpour) with Mauldah, throwing off a branch from Aamgach, Southwards, to Coogmar to the Cuttaha or Bogrutty (Bhagirathi) River.

Navigation Map.—This map shown the Aamgatch—Caagmar Channel as navigable for a part of the year, together with the upper part of the Culandry from Aamgatch to Luscarpour. The section between Aamgatch and Malda is omitted in the Navigation Map.

Water Routes.—But by the Water Routes the route Mauldah, Cotwally, Aamgatch, Lorcepour and Luscarpour is shown as navigable in the rainy season. The route being given in detail in the Water Routes is sufficient evidence of navigability for a part of the year.

Road Routes.—A ferry is recorded at Cotwally near Maulda.

Concor Nala.

55. This joined the Mahananda (above Sahebgunge) to the old [Ganges] course at Echbarpour. It is shown as navigable for a part of the year on the Navigation Map, but the route is not given in the Water Routes. I have followed the Navigation Map in Map No. IV. The channel between Serapgunge on the Mahananda and Jagrenatpour on the Nagore River has been shown as partially navigable on the same grounds.

Other Minor Rivers shown on Map No. IV.

56. There is no information available regarding these rivers except that fords occurred over several rivers, no ferries being recorded. Thus the Routan or Dubelly River was fordable at Balloah and Dubelly Gaut; the Connoy near Himautnagar and the Little Connoy near Alligunge.

Changes in the courses of the Kosi, Ganges and Bhagirathi Rivers (Map IV).

57. Rennell has shown three courses of the Kosi on Map IV :—

- (a) The Old Kosee which flowed near Purnea to Manihary and thence parallel to the Ganges to a point opposite Rajemal.
- (b) The course past Caragolah to Maniahry and thence to Rajemal as in (a) above.
- (c) The course due South from Morung (Nepal Terai) to a junction with the main Ganges due North of Colgong.

[There seems to be no doubt that the chronological sequence in changes in course in this river is as I have given it above; but I think that Rennell was wrong to treat the old bed between Camillapour and Rajemal as an old Kosi Bed. It seems more reasonable to suppose that it was once the main Ganges with the old Kosi mouth near Comillapour; this would place the old mouth of the Kosi at Comillapour and would explain the neck of river between Sicklygully and Comillapour. If we assume that at some time the Ganges assumed the Southern channel between Sicklygully and Rajemal several points of difficulty at once disappear :—

- (a) The Sicklygully—Comitpour Channel is explained.
- (b) The Northern channel would be occupied by the Kosi and its mouth moved from Comitpour to opposite Rajemal.
- (c) The main stream of the Ganges would no longer pass the head of the Cuttaha or Bhagirathi which would become decadent and would become merely an offshoot stream from the Kosi River.
- (d) The adoption by the Kosi of the Nepal-Colgong (Cuttry) channel would still further reduce the water supply of the Bhagirathi, and the latter would finally be reduced from the original main Ganges to the very minor stream which Rennell found it a century and a half ago.

Above I have assumed that the main Ganges moved from a Northern to a Southern channel between Sicklygully and Rajemal. The theory given above does not necessarily require a desertion of the Northern channel by the Ganges. That river may have flowed in two channels of which the Northern was once the more important. It may later have adopted the Southern arm as its main channel at the expense of the Northern, a situation that is constantly occurring in other reaches of the Ganges. Thus without any undue theorizing all difficulties of explanation can be removed.]

CHAPTER VI.

Rivers—Map V.

58. For description of the Teesta, Attrai, and Karatoya (Currattya) Rivers see special descriptions of the Teesta and Karatoya Rivers (Chapter IV, page 11).

The Mahananda and Nagore (on the West of Map V) are described with the rivers of Map IV (Chapter V, page 32). The Nagore Creek and Bangallah River are described with the rivers of Map XII (Chapter XIII, page 73); a note of warning regarding the Nagore Creek, however, is included in this Chapter. The Goggot River is described with the rivers of Map VI, page 9. The only rivers described in this Chapter are the Jubunaw; Tangan, and Purnabubah.

Jubunaw River.

59. *Map V.*—This river is an alternative channel to the Attri River. It leaves the latter above Consumagunge, and rejoins it at Kistnapour.

Road Routes.—These show the River as fordable at Nogong.

Navigation Map.—This shows the River as perennially navigable up to Nogong and as navigable for a part of the year up to Saumgunge.

No other information regarding this river is forthcoming.

Tangan River (Map V).

60. *Road Routes and Diary, Page 171.*—From North to South fords are recorded at Chappaty, Tarraberry, Peergunge, Saddamol and Saregunge. One ferry (at Ioye) is recorded.

Diary, Page 171.—The river was “small” at Chappaty.

Navigation Map.—The river was perennially navigable up to Bamingola, and then, by a cross channel to Currydah on the Purnabubah River. North of Rajanagur the river passed through a portion of the Barind [elevated] area, and lower down followed a depression between two detached portions of that [elevated] tract.

Purnabubah River.

61. *Map V.*—This river is shown as emanating partly from the Tangan River at Gubinagar, and partly from the Patradge Creek which was a tributary of the Teesta which it entered at Jarberry; the river practically united with the Teesta again, at Dinagepour below which point the Navigation Map shows the river as perennially navigable. The river joined the Mahananda at Rohanpour.

No further information is available regarding this river.

Nagore Creek.

62. This Creek leaves the Currattya at Seebgunge and is described under Map No. XII page 73. The Creek must not be confused with the Nagore River (on the West side of Map No. V) which is a tributary of the Mahananda River and has no connection with the Nagore Creek. For description of the Nagore River see Chapter V, page 32.

CHAPTER VII.

The Rivers of Maps VI A and VI B.

63. *Map VI A.*—The rivers Balasun, Mahananda and Dunk (or Doank) are described with the rivers of Map IV (Chapter V, page 33.)

For the Tista and Brahmaputra, see special descriptions of those rivers (Chapter IV, page 11).

The descriptions given in this chapter are the following:—

Part I.—Goggott River.

Part II.—Minor rivers of Map VI A:—

Section (i).—Those between the Tista and Brahmaputra Rivers, viz:—Surradingah or Sunecos; Durlal; Toresha (Torsa); Neelcomer; Jerdecker or Manshi (Jaldhaka); Teesta Creek; Teesta Nala; Allykuri Creek; Manaash and Samalkotta Creek.

Section (ii).—Those between the Tista and Mahananda Rivers, viz., Corto; Choweri; Talmang, Jabonau (Jabuna), Ponga, Curume and Gurumara.

Part III.—Minor Rivers of Map VI B, viz.—

Bonash (Manas) Guree Loheet and Luheet (Lohit) Dullaly; Barally; Kongeeah; Champomatty or Sunecos; Gourong; Sunecos or Champamatty; and Guddada.

PART I.

Goggot River.

Section I.—Cowagat to Rangpour.

64. *Map No. VI A.*—This river is formed from the waters of the Teestah Creek and Coolnea Rivers, and it appears to occupy the bed of the former from Cowagat to Borybarry.

Diary page 166.—The river was 3 feet deep on 22nd January 1766 at Little Jaffiergunge.

Road Routes.—There was a ford at Little Jaffiergunge.

Navigation Map.—The river is shown as navigable for a part of the year, from Rungpour upwards.

Section II.—Rungpour to Tengua.

65. *Map No. V.*—The section of the river follows the eastern edge of Map No. V.

Navigation Map and Water Routes.—The river is shown as perennially navigable for the whole of this section.

Road Routes.—There were ferries up to Rungpour and no fords below that place.

Diary page 155.—The river was only navigable in the cold weather up till January for 150 maund boats.

The evidence is rather contradictory.* [I have therefore shown the river as perennially navigable up to the ferry at Twelepour, and thence upwards as navigable only for a part of the year.]

* For further details see Chapter II, page 6.

PART II.

Minor Rivers of Map VI A.

Section I—Rivers between the Tista River and the Brahmaputra.

66. **Surradingah or Sunecoss River** (*Map VI A*).—A portion of the river formed the boundary between Cooch Behar State and what is now the Goalpara District. The only information forthcoming about this river (*Road Routes*) is that there was a ferry at Poonkru, some 10 miles above the junction of the river with the Brahmaputra (*see Map VI B*) and ferries at Bowanigunge and Chichacotta, South of Buxa Duar.

67. **Durlah River** (*Map VI A*).—There were fords across the river at Fooljera (near the Himalaya); Patgong (Patgram); Mongulhaut (Mogalhat) and Chocaul; and ferries at Durgaha and Quoilagot. Beyond this information nothing is available until the junction of the Durlah and Neelcomer Rivers (near which junction is Curygong), except that at Mongulhaut (Mogalhat) (*Diary page 173*) the river was 100 to 150 yards wide in February 1766.

Diary page 155.—Between Curygong and the Brahmaputra the river was always navigable for 2,000 maund boats. In November 1765 the current was very strong. At Buggoa (*Diary page 161*) at the conflux of the river with the Brahmaputra, in December 1766, Rennell estimated the current of the Durlah at 7 miles an hour.

Map VI A.—There were then many shoals near Buggoa. The river received the old Durlah on its left bank at Mongulhaut (Mogalhat). There is no information available regarding this old river [and its course was obviously not surveyed by Rennell or his Assistants].

68. **Toresha (Torsa) River** (*Map VI A*.—*Road Routes*).—This river was fordable at Sonarpour (above Beyhar or Cooch Behar) and there was a ferry at Beyhar; there (apparently) the Toresha changed its name to Neelcomer. Beyond this no information is forthcoming.

69. **Neelcomer River**—(*Map VI A*).—This river took up the water of the Toresha (Torsa) River at or near Beyhar (Cooch Behar) and just below that place received the Jerdeerker or Manshi (Jaldaka) River.

Water Routes.—By these the Neelcomer was perennially navigable from the Durlah to Beyhar (Cooch Behar).

Road Routes.—Ferries were maintained at Coorsah and Nawassy.

Diary page 173.—At Foolberry in February 1766 the Neelcomer's bed was six to eight yards wide, and its water four-hundred yards across. The current was not rapid, and the river was very deep.

Map VI A.—A branch of the Sunecoss called the **Doodcomer**, entered the Neelcomer from the East near the Borthaut.

From Nazrgunge the **Foolcomer** leaves the Neelcomer, reaches the Doodcomer near Borthaut and [its apparent old course] can be followed Southwards from the Doodcomer to the Durlah which it entered near Sittalyah.

From Gogomary, on the right bank of the Neelcomer, a Creek issued and joined the old Durlah above Mongulhaut (Mogalhaut).

[The deltaic character of the rivers noted above, in their interlacings, is interesting.]

Navigation Map.—The river was always navigable from Beyhar (Cooch Behar) down to Curygong.

70. **Jerdecker or Manshi (Jhaldaka) River**—(*Map VI A*).—This river entered the Neelcomer below Beyhar (Cooch Behar) after receiving on its left bank, successively, the **Jaganath**, **Comlah**, **Manshi** and **Booda Toresha** (old Torsa); and on its left bank the **Mawl (Mal) River**.

Road Routes.—The only information available regarding these rivers is that the Boodah Toresha was fordable at Guntong (near the Himalaya) and the Moojenni River (tributary of the Manshi River) near Cantalbary.

71. Teesta Creek.—(*Map VI A*).—This river left the main Teesta opposite to and just above Farsidangah, and its course can be traced as far as the Brahmaputra near Chilmari on Map VI A, near Sunagar, North and South of which place, for a total length of about 10 miles, the Goggot River occupies a portion [of what may have been the original bed of Teesta Creek].

Some 11 miles North of Chilmari the Creek enters the Brahmaputra, but a river called the Teesta River [which is perhaps the original South course of the Creek], runs for about 17 miles parallel to the Brahmaputra finally falling into the Brahmaputra at Jelcupy some 4 miles below the Southern margin of the Map. (*See Map XII.*)

Diary page 154.—Between Oliapour and Chilmari the Creek was “not over” 100 yards wide in November 1765 and it was very shallow in places, and not always navigable. The river was then so low that Rennell was unable to get further up stream than Oliapour in small boats, and he had to proceed by road from that place to Rungpour.

Navigation Map.—By this the Creek is shown as navigable for a part of the year from the Teesta River (main stream) to Borybarry; and again from Teetari to the Brahmaputra. But from Oliapour to the Brahmaputra it is shown as perennially navigable. [This last is obviously a mistake, since the evidence of the Diary given above is unchallengeable.]

Road Routes.—Fords occurred at Sibegunge; Subungunge; Cheerabeeja Calpauny; Sunagur; Aoalyah; near Cowanyah; Chandamarah and at Oliapour. No ferries are shown anywhere, across this river.

72. Teesta Nala.—(*Map VI A*).—This Nala ran out of the Teesta Creek a few miles below its exit from the main Teesta. The Nala, under the name of Coolnee River, rejoined the Teesta Creek some ten miles below Calpauny, on the latter.

Diary page 172.—The Nala was very small and was fordable at Chowa Rajah Haut in February 1766.

Affluents and Effluents of the Teesta Creek.

73. Map VI A.—It will be observed that nearly all the rivers on each side of the Teesta Creek are attached to it by interlaced rivers. [This interlacing gives the impression of deltaic conditions.]

Diary page 154.—Rennell has left no information regarding these minor rivers beyond that given below:—

(i) The Allykuri Creek was fordable at Dammo Choculah (near Rungpour) in mid-November 1765, and was then two feet deep.

(ii) The Mannash Creek which crossed the Oliapour-Rungpour Road was fordable at the same time.

This river is described with the rivers of Map V in Chapter VI page 11.

74. Sanalkotta Creek.—(*Map VI A*).—This effluent left the Teesta River just below the falls at Allygunge and after frequent interlacings with other rivers, leaves the southern edge of Map VI A below Buddlegunge where it assumes the name of Teesta River. Later on (Map V) this river is destined to become the Koratoya.

Diary page 166.—On 22nd January 1766, the Sanalcotta was only 2 feet deep near Jaffiergunge and at Kaleepour (six miles further up) was two and a half feet deep and about 60 yards wide, the water being remarkably clear.

No other information is forthcoming regarding this river.

PART II—SECTION II.

Minor Rivers between the main Teesta on the East, and the Mahananda on the West (Map VI A).**Corto River, its tributaries and effluents.**

75. This river, so far as the area covered by Map VI A is concerned was the most important affluent to the Teesta River. It rose in the Himalaya and after a course due South in the plains for some thirty miles, the river divided into two branches; the Tangan River which flowed more or less due South, across Map V till it met the Mahananda River at Oyoe, and the main Corto which joined the main Teesta at Dewangunge.

The Tangan is described under the rivers of Map V in Chapter VI.

After the take-off of the Tangan, the Corto received several tributaries from the north, none of which were important streams.

From West to East these rivers were respectively the Chowery, Tal mang, Jabonau and Ponga. The two last, however, flowed into the Corto through the Curume River, and the Guramara. The former of these last two rivers was partially a spill channel of the main Teesta, and the latter is the cross river on which Nonongunge, stood.

Road Routes and Diary pages 171 and 169.—The Corto was fordable at Majill, Meynagurry, and about three miles South-West of Nobobgunge. At this last place the river was 150 yards wide and the stream rapid in February 1766. At Majell, the Corto was two feet deep in the same month and about 90 yards wide.

Road Routes and Diary page 169.—The Chowery was merely a rivulet and there was a ford across it at Dabonee.

[No information is forthcoming about the Talmany River.]

Diary page 168.—The Jubbonau and Ponga were two shallow rivers.

Diary pages 171 and 165.—The Curume was fordable at Conquey in February 1766; but at Ummercomma it was deep and rapid. [It appears that much of the water which the lower Curume might have carried was diverted down the Guramara River, past Nabobgunge, which was a "deep and rapid" river in February 1766].—*Diary page 168.*

Diary page 168.—[The name Corto requires careful consideration.] In a footnote to the Diary, LaTouche remarks "Corto is a corruption of Karatoya." Rennell called the Corto by the alternative name of Coretya—*Diary page 171.*

Rennell gives various spellings of Karatoya on his maps and in his Diary and elsewhere, viz :—Corto, Coretya, Curratya, Curratty and Curtya.

Taking his maps alone we can trace the "Corto or Coretya" from the Himalaya to the Teesta below Dewangunge. Immediately below Dewangunge an affluent takes off (Curcurry River, Map VI A) and flows South to Comer-gunge, after which this affluent is called the Curtya (Map V) until it joins the Curratty River just below Consugarrya on that map. The Curratty is undoubtedly the Karatoya of ancient times [and it would appear that the Corto or Coretya, Curcurry, Curtya Curratty represent an original (or the original) course of that famous river. If so, Rennell's main Teesta from the neighbourhood of Dewangunge downwards is a more modern channel than the original Karatoya, and has beheaded the latter].*

[See description of Karatoya River, Chapter III page 10, and also Chapter XXI page 96.]

* The river on Map VI A immediately to the East of the Currarry is called Assorky on that Map and Curtu on Map V. It also joins that Teesta which ran into the Curratty, and it took off from the main Teesta, as the Samalkatta Creek above Dewangunge.

PART III.

The Minor Rivers of Map VI B.

(Goalpara District, etc.)

76. South and East of the Brahmaputra River as shown on Map VIB, several minor rivers occur, regarding which Rennell has left no information.

On the North of the Brahmaputra from East to West the following rivers feed the Brahmaputra in sequence:—

Bonash (Manas) Haarapang, Champomattey or Sunecoss; Gourong; Sunecoss or Champamattey; and Gaddada.

On the West, from North to South, the Surradingah or Sunecoss; the Durlah (Darla) and Tista Creek. These rivers on the West of Map VIB are dealt with in Part II, Section I of this Chapter.

It will be observed that in the Northern Rivers the names Champomattey and Sunecoss recur. [This similarity of names is very confusing.]

Bonnash (Manas) River.

77. This river formed the boundary between Bengal and Assam. It was reinforced on its left bank by the Gurree Luheet and Luheet Rivers. These have already been mentioned in the description of the Brahmaputra (Section I)*; they were navigable for small boats throughout the year and the two rivers were branches of a Luheet River which left the Brahmaputra "three days" above Goalpara. Of rivers on the right bank of the Bonnash, the Dullely, Barally and Kongeeah are the only ones about which any information is forthcoming.

Of these three rivers (*Diary page 159*) the Dullaly was not over 3 feet deep at Secalmay (below Bijnee) in December 1765 and "must be dry" in the dry season. *Diary pages 158 and 159*.—There was a ferry over the Berally at Charpony on the Bijnee Road. On 12th December 1765, the river was 150 to 200 yards wide at Charpony, and too rapid to ford. Its depth was $4\frac{1}{2}$ feet. The words actually used by Rennell in his diary are important, "The Barally is now $4\frac{1}{2}$ foot deep and from 150 to 200 yards broad and runs too rapid to be forded."

This is the only case [that I can find] in which Rennell refers to any river as fordable which is more than 3 feet deep. [And I do not think that in this case Rennell meant that the river would be fordable with that depth of water with a slacker current.] This matter is referred to in the discussion in these notes upon Rennell's depth standard for a ford (Chapter II, page 6).

Diary pages 156 and 157.—The Bonash (Manas) was fordable in December 1765 but at what point is not stated. The river was not navigable for even very small boats in the driest season and was not used for floating timber down to the Brahmaputra; but the latter defect was due to their being no understanding between the Assamese and the inhabitants on the Bengal side (Goalpara District) of this river. In general the bed of this river was 200 yards broad.

Diary page 159.—The Kongeeah is not mentioned except as being a "small river" situated in a pleasant and well cultivated valley. [Presumably it was fordable in December 1765.]

Diary page 156.—A few miles West of Jughigopah (Jogigopa) the Haaripani, a small river, enters the Brahmaputra. The river was fordable but was used for floating timber from the hinterland (Bijni Forests) to the Brahmaputra.

78. *Diary page 156*.—The Champomatty or Sunecos River entered the Brahmaputra about 9 miles West of Jughigopah. It was fordable between Bassagong and Pokagong in December 1765, and was used for floating timber to the Brahmaputra from the hinterland.

79. *Diary page 156.*—The Gowrong River lay about half way between the Champomatty or Sunecôs, just described, and Rangamatty. It was fordable at Botagong late in December 1765 and was used for timber floating. At Botagong it was then found to be 3 feet deep.

80. *Diary page 156.*—The Sunecos or Champomatty River fell into the Brahmaputra some 10 miles below Rangamatty, at Dubarye (Dhubri). In December 1765 this river was found to be about 200 yards wide and 12 to 14 cubits (say 20 feet) deep for 40 miles above Dubarye.

Navigation Map.—But in the Navigation Map the river is not shown at all except between the Brahmaputra and some 9 miles above Rangamatti; for which portion the river is shown as perennially navigable. On Map VIA therefore above that point I have shown the river by the double symbol of perennial and part-year navigation.

[I think that the information as given in the Diary that this river was deep for 40 miles above the Brahmaputra must have been obtained from hearsay], for there is no evidence that Rennell or his Assistants visited the higher reaches of the river. *Diary page 161.*—The highest point mentioned is Goga, at which place they crossed the river on rafts, on 22nd December 1765.

81. The Gaddada River joined the Rangamatty River just before the latter entered the Brahmaputra at Dubarye (Dhubri). No information regarding this river is forthcoming and [it is clear that the upper reaches of the river are but speculatively mapped on Map VI A].

Road Routes.—There was a ferry over the river at Mittabang, on the road from Dubarye (Dhubri) to Rangamatty.

CHAPTER VIII.

Rivers of Maps VII A and VII B.

82. The Brahmaputra and Meghna Rivers are described in the special descriptions of those rivers (Chapter IV).

The Manaash, Jenni (Jenai) and the unnamed river between them, are described with the rivers of Map XII.

The remaining rivers of these two maps have been subdivided as follows:—

- Part I.—Soorma river (Map VII B) including the Beemahona river.
- Part II.—Rivers west of the Brahmaputra, viz.:—Bannar and Toke (Map VII A).
- Part III.—Rivers North of the Soorma River, viz.: Chindree, Callaberac, (Map VII B).
- Part IV.—Rivers South and East of the Soorma, viz.: Cussiara, Brack.(Barak), Bussyah and Gurguree Creek (Map VII B).
- Part V.—Bolee River (Map VII B) including the Dunnuh, Dannya and Gorah Rivers.
- Part VI.—Rivers between the Soorma and Bolee Rivers, viz.:—two unnamed Creeks, a branch of the Bolee, and Lamakerrah.
- Part VII.—Rivers between the Bolee and Brahmaputra Rivers, viz., Moggurah, Cungas, Sumusserai, Armarrah, Suhar, Nursingdah, Hydecally and Dunnuh (second part).

PART I.

Soorma (Surma) River.

83. *Map VII B.*—This river enters the Eastern edge of Map VII B near Bargah, and running westwards passes Silhet, Chattuck, and Solagur. At Solagur it turns South, passes Currimgunge (Karimganj) and Azmerigunge at which place it changes its name to the Beemahona River, which name is maintained until the river joins the Brack (Barak) River from the East near Sujatpour. These combined rivers form the Megna River.

Navigation Map and Water Routes.—These show the river as perennially navigable from Bargah down to the junction with the Brack River.

Road Routes.—Ferries existed at Silhet, Sawgunge, Moradpour (near Callyajury) and Azmerigunge. A ford is shown at Bangah, and another at Digley (West of Sylhet) but the latter is over a small stream and not over the Surma.

No other information regarding this river is available.

PART II.

Rivers West of the Brahmaputra.

[The Rivers South of Dawangunga are described with the Rivers of Map XII in Chapter XIII.]

Bannar River.

84. **Navigation Map and Water Routes.**—These show the Bannar River as navigable for a part of the year from Pykenhaut on the Brahmaputra, down to Bermyah on the Toke River; thence as far South as Simulya (*Map VIII A*): the same sources give the river as perennially navigable.

Map VII A.—From Bygonbarry an unnamed Creek leaves the Brahmaputra and joins the Bannar River above Deetpour. This unnamed Creek (*Navigation Map and Water Routes*) was navigable for a part of the year only.

Diary pages 147 and 152.—The Diary confirms the information given above.

Toke River.

85. This River joined the Brahmaputra (from Toke) to the Bannar River.

Navigation Map and Water Routes.—It was always navigable.

Road Routes.—There was a ferry over the river at Toke.

Diary page 152.—This confirms the information given on the Navigation Map.

PART III.

Rivers North of the Soorma River.

Chindree River.

86. *Map VII B.*—This river joined the Soorma some nine miles east of Chattuck.

Navigation Map.—This map shows the Chindree as navigable for a part of the year as far as a place called Gentiah which I have plotted roughly on Map VII B from the Navigation Map. [Allowing for errors introduced by the very small scale of the Navigation Map it appears that the "Rajah's residence" in the hills on the Casee Nala, which joins the Soorma at Silhet, is the place to which navigation was possible, through the Chindree and perhaps across country during the rainy season. On Map VII B, for lack of better information I have shown the Chindree as navigable from the Soorma to the hills.]

Callaberac (Kalabrack?) River.

87. **Navigation Map and Road Routes.**—The map shows this river as always navigable from Pandua, at which place there was a ferry.

PART IV.

Rivers South and East of the Soorma River.

Cusiara River.

88. *Map VII B.*—This river comes into Map No. VII B some 10 miles south of Bangah, but is joined to the Soormah at Bangah by a Creek marked upon the map as "navigable during the wet season."*

Passing Latoo, and Dewanbazar, at the latter place the Cusiara assumed the name of Brack River which name continued until the Megna River was met west of Sujatpour.

Navigation Map.—This map shows the Cusiara and Brack Rivers as navigable for a part of the year only, throughout their courses.

Road Routes.—A ferry was maintained across the Brack River at Dewanbazar.

Bussyah Creek.

89. This Creek left the Soormah River at Shawgunge and after running South for 9 or 10 miles, it turned East by South, flowed past Nabobgunge, and rejoined the Soormah at Azmerigunge.

Navigation Map and Water Routes.—By the Navigation Map the river was navigable for a part of the year only.

* This Creek was similarly navigable to Shawabas on the Soormah.

Gurguree Creek.

90. This Creek joined the Bussyah Creek to the Cusiara River, flowing past Aurungpour.

Navigation Map.—On this map the Creek is shown as navigable for a part of the year only.

Road Routes.—This Creek was fordable at Bronbaug.

PART V.

Bolee River.

91. *Map VII B.*—The medley of rivers and river names West of the Soormah River makes explanation difficult and to simplify matters I propose to treat as the Bolee River, from Laour downwards, the following:—

- (i) Laour to Goglajoor—Bolee River;
- (ii) Goglajoor to Paunchot—Dunnuh River;
- (iii) Paunchot to Dackey—Bolee River;
- (iv) Dackey to Neckley—Dannya River;
- (v) Neckley to Delolpour Ghat (on the Megna River)—Gorah River.

Maps Nos. VIIA and VIIB.—This succession of rivers follows the continuous blue band on Map VII B from Laour to Neckley. Section V (Neckley to the Megna River) falls on Map No. VII A and is only included here to round off an area.

Road Routes.—The river had ferries at Laour, Seokath and Etenah and is nowhere shown as fordable.

Navigation Map and Water Routes.—Sections I to IV inclusive were navigable always, but Section V, (Gorah River) only for a part of the year.

PART VI.

Rivers between the Soorma and Bolee Rivers.

92. The Soormah and the Bolee Rivers were attached by the following rivers (from North to South):—

Navigation Map and Water Routes.

- (i) An unnamed Creek from Barragur to Laour; navigable during the rains.
- (ii) The Bolee River from Goglajoor to Callyajury; navigable during the rains.
- (iii) An unnamed Creek from Curcha to Azmerigunge; navigable during the rains.
- (iv) The Lama-Kerrah River from Azmerigunge to Ullooah which was perennially navigable.

PART VII.

Rivers between the Bolee and Brahmaputra Rivers.

93. *Maps VII A and VII B.*—The only rivers about which any information is forthcoming are those rivers marked with the temporary navigation symbol on Maps Nos. VII A and VII B. This information regarding navigability has been obtained from the Navigation Map.

Road Routes.—Ferries existed over the Cungas at the point marked Ferry, East of Natherconah, and at Dowtan. Over the Mogurah at Soonajure, and there was a ford across the Nursingdah Creek at Jafferbad.

Navigation Map and Water Routes.—These both show the Nursingdah the Hydencally Creeks as navigable for a part of the year; and also show that the current ran from the main Brahmaputra near Osunpour to the junction of the Hydencally Creek and Dunnuh River just West of Badlah. Thence the route was against the stream along the Upper Dunnuh River till it met the Bolee, South of Paunchot.

[The apparent abnormality of the direction of currents of the Narsingdah and Hydencally Creeks requires careful consideration.] It will be observed that those creeks lead towards the confused interlacing of rivers in the neighbourhood of Azmerigunge. On Maps VII A and VII B the low lying area in which the interlaced rivers occur, is coloured brown. The limits of the area are very approximate indeed, and have been taken from Rennell's five mile maps; the outside limits follow approximately the outside limits of Rennell's swamp symbols as these maps.*

Navigation Map.—This map shows a continuous waterway from the Curybarry Hills (North West corner of Map No. VII A) mainly along the Cungas River to the Bolee River near Gogglajoor. Towards each end of this route I have shown the navigation route by doubtful symbols (West of Pikerra and West of Gogglajoor.) The reason for these doubtful portions is that the scale of the map is too small to allow one to follow the navigation routes exactly.

*Owing to indifferent printing those symbols do not show clearly on Maps Nos. VII A and VII B.

CHAPTER IX.

Rivers of Maps VIII A and VIII B.

94. The Rivers West of the Western bank of the main Ganges are described with those of Maps XII and VIII B.* The Lojung is described with the rivers of Map XII and the Bannar with those of Map VII A.† For Ganges, Brahmaputra and Meghna see special descriptions for those rivers (Chapter IV).

The descriptions in this Chapter are as follows :—

Map VIII A.

Part I.—Dollasery (Dhalesri) River, including the Jaffiergunge, Corti and Cantabody Creeks; and Curattygunga.

Part II.—Issamutty River in three Sections:—

Section I, Allachypour to Bandura.

Section II, Suramutty Creek, etc. (Ganges to Bandura).

Section III, Bandura to the Meghna River.

Part III.—Rivers North of the Dollasery, viz., Conoi, Currua (or Gajically); Bunse, Boorygunga (Buriagunga) Callatyah and Tagarpour Creek.

Part IV.—Rivers between the Dollasery and Isamutty Rivers, viz., Idracpour, Toolsey and Saapour Creeks.

Part V.—Rivers South of the Issamutty River, viz., Tide Nulla, Churan, Kunderpour and Noorpour Creeks; Calligongah (Kaligonga); and Luricool (Luricul) Creek. Creeks West of Rajanagar, and Mendigunge Creek.

Maps VIII A and VIII B.

Part VI.—Rivers East of the Meghna River, viz., Teetas (2 sections); Boorygonga; Goomty (or Gomut) of Map VIII A; Dackatiyah, Little Fenny, Daddana Creek and Fenny River of Maps VIII A and VIII B.

Part VII.—Rivers between the high land North of Dacca and the Brahmaputra and Meghna Rivers, viz., Luckya (Little Burrampooter); Balco Creek; Little Burrampootry or Poggolah; and Burrampooter Creek.

PART I.

Dollasery (Dhalesry) River.

95. *Map No. VIII A.*—This river flowed from the Ganges at Jaffiergunge (neighbourhood of Goalundo) and joined the Issamutty River (Issamutty or Ichamati) near Tagerpour, some seven miles South of Dacca.

Near Jaffiergunge the River received a number of Rivers on its left bank, which are dealt with separately in the descriptions of the Rivers of Map No. XII (Chapter XIII). In this neighbourhood in Rennell's time the Dollasery went by several different names. It emerged near Baljuree as the Dollasery and no complications in name occur until Curruah is reached. Here another playground of Rivers was situated in the triangle made by Curruah, Dacca and Tagerpour.

Navigation Map, Water Routes and Diary page 126.—The River from Jaffiergunge to Tagerpour was always navigable.

* Chapters XIII and IX respectively.

† Chapter VIII.

Atlas Plate No. 56.*—The first five or six miles of the River East of Jaffiergunge were known as the Jaffiergunge Creek. The next mile or two as the Corti Creek, after which for a few miles the name used was Cantabodey Creek.

Diary page 181.—At the junction of the Corki and Cantabodey Creeks, 4 to 5 miles East (by river) of Jaffiergunge, in November 1766 all the waters of the Dollasery were compressed into 70 yards width. The Cantabodey took off immediately [apparently as a spill channel] and flowed South. At the same time the Dollesery broke into two channels, the Southern of which was known as the Curatty Gonga; it rejoined the Dollasery at Goalpara. The Northern channel, although the main Dollesary, was also known as the Andydaw River, as far as Goalpara.

The Cumerally Creek was narrow and its current rapid.

The Curatty Gunga was not followed by Rennell, but it was a largish river. From Pialapour Westwards the entire country was swampy and in November 1766 Rennell had difficulty in tracing out the actual course of the river. These swamps were a continuation of the great swamps which extended downwards (see Map No. XII) from Nattore.

Diary page 180.—Except near Pialapour where there was some high land, the swamps extended as far as Saapour, but between Pialapour and Saapour they were mainly on the South of the river.

Atlas Plate No. 56.—This Plate only shows the limits of the main swamp as far East as Baljuree; and I have followed these limits on Map No. VIII A. At Currua above Saapour the Currua or Gazically Creek took off to the East; at Currua this Creek was tidal, the tide entering the Dollessary from the Issamutty, and passing up the former to Currua. It is not stated how far the Dollessary was tidal above Currua. The river between Saapour and Currua was about half a mile wide in most places (November 1766).

At the junction of the Dollessary and Issamutty Rivers, their combined width was about $1\frac{1}{4}$ miles.

Road Routes.—There were ferries at Jaffiergunge (?) Goalpara, Bowanspour, Callatya, and Tagerpour. No fords are recorded.

Memoir page 272.—In the rainy season the whole of the water of the Tista passed down the Dollasery to the Megna; and in the dry season, only a part of that water reached the Megna. [Nowadays none of the Tista's water goes down the Dollasery; therefore in Rennell's time that river must have been larger than it is now, and the cutting off of the Tista supply (amongst other reasons) may explain why the Dollasery has lost importance. See description in section III of Attrai River, Chapter IV, Part V, page 25.]

PART II.

Issamutty River.

96. *Map No. VIII A.*—This river was very complex in its emanation from the Ganges, and its description will best be approached by starting in the middle of the River at Nabobgunge. From that place the course Eastwards to the junction with the Dollessary is simple, and thence to the Megna, which it joined opposite Naraingunge.

Atlas Plate No. 56.—With regard, however, to the reaches from near Tagerpour to the Megna, some comment is necessary. [It seems strange that a minor river like the Issamutty should not be considered to be a tributary of the Dollessary instead of the converse.] But Atlas Plate No. 56 shows the name Issamutty for this portion of the course. It will be seen later that the Boory-Gonga flowed from the Dollessary from Hisseratpour by the course of the Tarang River to Dacca and thence down to its junction with the Issamutty North-West of Naraingunge. [It seems probable that the Dollasery from

Jaffiergunge represents the old course of the Ganges to Dacca (if the Ganges ever flowed past Dacca) and that its original course was through the Tarang Channel to Dacca and thence South-East to the Megna. This would account for the combined Dollessary and Issamutty being called by the latter name in its lowest reaches in Rennell's time.]

If we return to Map No. VIII A, to Nabobgunge, it will be seen that the Issamutty was made up of two channels, one from Allachypour on the Ganges, and the other by two exits from the Ganges, one at Monsudabad and the other near Caltapour. These combined streams met at Bandura. We may therefore consider the river in three sections:—

Section I.—The Issamutty from Allachypour past Jeetka to Bandura.

Section II.—The feeder from the South-West.

Section III.—The combined River from Bandura to the Megna River.

Isamutty River.

Section I.—From Allachypour to Bandura.

97. The main course of this river was from Allachypour past Gwalcally and Jeetka. At Gwalcally it received the combined waters of the Cantabotey and Singdaw Creeks; on each side of Gwalcally two rivers (Nabobcally and Bonnisear) were thrown off back to the Ganges.

There are no complications in the rest of this Section of the river.

No information is available about any of the minor rivers mentioned above.

Navigation Map and Water Routes.—As regards the main course, the river was navigable for a part of the year only, and in November 1766 this length of the river was only about one foot deep.

Isamutty River—Section II.

98. *Diary page 128.*—The Surramatty Creek took off from the left bank of the Ganges about 9 miles below Hajjgunge, i.e., near Calkapour. It was about 200 yards wide at its exit from the Ganges, and was always navigable to Bandura. It maintained its average width of 200 yards as far as Bandura on the 18th October 1764.

Navigation Map.—This confirms the navigability of the Surramatty.

Water Routes.—Route Number 214 (second route Dacca to Hajjgunge) is worded as follows:—

“ Second route when Surramutty River is dry ”

	Miles.
“ From Keederpore to the Ganges by Chorcumerdour ...	9½
“ Head Surramutty River	6½
“ Hajygunge	9½

[The reference to the Surramutty running dry seems to be a mistake, and I prefer to accept the evidence of the Diary supported by the Navigation Maps.]

Section III.—Bandura to the Megna River.

99. *Diary page 128—Navigation Map and Water Routes.*—The Issamutty was always navigable from Bandura to its junction with the Dollessary and was 200 yards wide generally in October 1764.

Navigation Map.—From that junction to the Megna the river was always navigable.

[For a possible original connection between this river and its namesake on Map XII, see Chapter XXI page 96.]

PART III.

Minor rivers north of the Dollaserry river.**Conoi (or Caagmar) River*.**

100. *Maps Nos. VIII and XII.*—This was a spill River from the Lojong River (Map XII) to the Dollaserry (Map VIII A).

Diary page 180.—The river was very small and only deep enough for small boats in the dry season.

Navigation Map.—The river was only navigable for a part of the year. It is not included in the Water Routes.

See also Conoi River—"Beheaded Rivers"—Chapter XXI, page 96.)

Currua or Gazically Creek.

101. *Map No. VIII A.*—This Creek ran out of the Dollaserry River at Curruch and connected that River with the Bunse River just below Sabaar.

Diary page 180.—Only small boats could navigate this Creek in the dry season, and then only at high tide. But in the wet season any boats could navigate the Creek.

Atlas Plate No. 58.—The Creek is there called the Gazically Creek.

Bunse River.

102. *Maps XII and VIIIA.*—This river (Map XII) left the Janni (Jenai) River not far below its offtake from the Brahmaputra and was actually connected with the great river by a minor channel. It flowed South and inside or along the edge of the old alluvion to Burtool (about 10 miles North-West of Dacca—Map VIII A) where it joined the Tarang or Boory-Gunga River.

Navigation Map.—The river is shown as navigable always from Burtool up to Dumroy which is well above Sabaar. Thence a route is shown as navigable for a part of the year to Caugmahry, [but if this route existed it ran partly across country. I have thought it best not to consider the navigability of the river above Dumroy.]

Water Routes.—These show the route from Dacca to Dumroy as passing Burtool, but is not stated definitely if the route was perennially navigable.

[I have thought it best only to show the river from Dacca to Dumroy as navigable for a part of the year, although it is quite possible that it was perennially navigable.]

Atlas Plate No. 58.—The river is called Bunse as far South as Burtool.

Boorygonga† (Buriaganga) River.

103. *Map VIIIA.*—This river left the Dollessery near Burtool in a channel called Tarang, but the Tarang is called Boorygonga on Atlas Plate No. 56 from the Dollaserry, past Dacca, to the junction with the Issamutty River.

Diary pages 126 and 140.—The River was always navigable for the largest boats, and its general width (February and March 1765) was 250 yards.

Navigation Map and Water Routes.—These both corroborate the Diary. [For tidal information see "Tides" Chapter XVIII, page 90.]

*Caugmahry on Map XII. The place is just above the junction of the Lojong and Conoi Rivers.

† A second view of this name occurs on Map VIII A. See Part VI of this Chapter, page 58.

Callyteer Creek.*

104. *Map VIII A.*—This Creek joins the Dollaserry to the Boory-gunga immediately South of the alignment of the Tarang River. The Creek is shown as navigable for a part of the year.

Navigation Map and Water Routes.—In the Water Routes the Creek is described as first navigable “early in the rainy season.” The name of the Creek is not marked on Map VIII A, but that of the village which gave the Creek its name.

Memoir page 265.—Rennell thought that there was reason to suppose that Dacca once stood as the main Ganges River.

Tagerpour Creek.

105. *Map VIII A.*—This Creek ran between Tagerpour on the Dollaserry and Dacca.

Diary page 179.—“The Tagerpour Creek is $2\frac{1}{2}$ cubits deep at high water in the fair season, but it is so narrow and the turnings in some places so short that a large boat cannot turn.” The area crossed by the Creek was a very low plain which in the rainy season could be crossed by the largest boats.

“The flood tide in the Tagerpour Creek comes from the Dollaserry.”

Road Routes.—There was a ferry across the Creek some 4 miles from Dacca. No fords are recorded.

PART IV.

Minor Rivers between the Dollaserry and the Issamutty River.

(These rivers are considered from East to West.)

Idracpour Creek.

106. *Map No. VIII A—Water Routes.*—A route existed in the rainy season from Idracpour (East of Ferringhybazar) to Surajabad on the Megna.

Toolsey Creek.

107. This Creek passed from the Dollaserry to Churan on the Issamutty.

Diary page 178.—The Creek was the common route between Churan and Dacca and was always navigable for the largest boats; but it was narrow and crooked.

Navigation Map and Water Routes.—These confirm the evidence of the Diary as regards navigability.

Atlas Plate No. 58.—The Toolsey ran through a very low lying area.

Saapour Creeks.

108. *Diary page 180.*—“We noted 2 small creeks that lead from it [Issamutty] into the Dollaserry at and a little below Saapour, but only small dingies can pass during the fair season.”

These Creeks are not shown in the Navigation Map or entered in the Water Routes.

*A second river of this name occurs on Map VII A. See part VI of this Chapter, page 53.

PART V.

Minor Rivers South of the Issamutty River.

[*These Rivers are those which occur in the triangle Issamutty, Ganges, and Megna Rivers.*]

Tide Nulla.

109. *Map VIII A.*—It will be seen that a minor stream marked “ Tide Nulla ” passed from Meergunge (West of Ferringhybazar) to the Calligongah River near Nunkissergunge.

Diary page 123.—On 2nd August 1764 the inundation near this river was 6 feet deep.

Atlas Plate No. 58 and Navigation Map.—This stream was navigable during the rainy season.

Diary page 124.—The stream was bridged at Meergunge.

Churan Creek.

110. *Map VIII A.*—This Creek left the Issamutty River at Churan and ran into a “ Morass,” South-East of Churan. Rennell passed along it in October 1764 (*Diary page 130*), and merely described it as a “ very small Creek.”

Keedurpour Creek.

111. This Creek left the Suramutty at Keedurpour and joined the Ganges at Chorcumerdour.

Navigation Map and Water Routes.—The Creek was perennially navigable.

Noorpour Creek.

112. *Map VIII A.*—This Creek ran out of the Keedurpour Creek and reached the Ganges at Nulluah.

Diary page 130.—Rennell described it as a “ very small Creek ” in November 1764 when he passed through it—in small boats.

Calligongah (Kaligonga) River.

113. *Map VIII A.*—This river left the Ganges near Nulluah (North-West of Rajanagur) and flowed East to the Megna.

Navigation Map and Water Routes.—The river was always navigable.

Luricool Creek.

114. This Creek flowed out of the Ganges at Chycundy (South of Rajanagur) and joined the Calligongah a few miles West of Chiddypour.

Navigation Map and Water Routes.—The Creek was always navigable and was greatly used in navigation. The current from Chycundy to the Megna always flowed from West to East, the flood from the Megna not being strong enough to neutralise its current from the West.—*Diary page 137.*

Creeks West of Rajanagur.

115. *Map VIII A.*—*Diary page 131.*—These Creeks were navigable as shown on Map VIIIA, but the smaller creeks were only navigable at high tide.

Navigation Map and Water Routes.—The Creeks are not mentioned.

Diary page 139.—The small Creek from Luricool to Rajanagur was only navigable at half-tide.

Mendyguge Creek.

116. *Map VIII A.*—This Creek which leaves Mendygunge on its West connected the Ganges and Megna Rivers.

Diary pages 131 and 133 & Navigation Map.—The Creek was always navigable.

PART VI.

Minor Rivers East of the Megna River.

Teetas River (Section I) and Bemalya Creek.

117. *Map VIII A.*—These rivers had a joint source East of Bejurah and after the junction the Teetas flowed in an erratic course past Singerbill, and entered the minor and Eastern course of the Meghna at Gusipour. The Bemalya joined the Meghna above Sunerampour.

Road Routes.—There was a ford at Hurringber and a ferry at Gusipour.

Navigation Map.—This shows the Teetas River as perennially navigable from Gusipour to near Rampour; after which place, first by the Teetas then by the Bemalya and lastly across country, a route is shown as navigable for a part of the year to Lacki (on the Northern margin of the map). [I have shown the latter part of the route for what it may be worth on Map No. VIII A.] A tributary of the Teetas is shown as navigable as far as Noornagar.*

Teetas River (Section II).

118. *Map No. VIII A.*—South of Gusipour another River called Teetas leaves the Eastern Megna, and rejoins it near Mashumara. [This River appears to be an original continuation of the Teetas (Section I) beheaded† at Gusipour by the Megna River.] There is no other information available regarding this section (II) of the Teetas River.

Boorygonga River.

119. *Map No. VIII A.*—No information is available regarding this river except its general course, which ran from Gusipour, Southwards, to Massiminagar on the Goomty or Gomut River.

I include the river here because of its name, which may either mean :—“Old Ganges” or “Old River”. [The latter meaning is obviously the correct one.]

Goomty or Gomut River.

120. This river rose in the hills East of Comillah and flowed Westwards till it almost touched the Megna at Daoudnandy; there it had a connection with the Megna, but its main course turned South and ultimately reached the main Megna at Chandpour.

Navigation Map and Water Routes.—These show the river as only navigable for a part of the year from Comilla to Mirzapour which was some 7 miles to the West. The rest of the course of the river was always navigable.

* The Navigation Map shows a partially cross country route from Noornagar South-West to a point on the Gomut River East of Allynya. [I have neglected this route as I cannot follow it with any accuracy on the large scale maps.]

† See Chapter XXI, page 96.

Road Routes.—There were ferries at Massimnagur, Daoudnandy and Coweddy. No fords are recorded.

[It will be observed that a slight infringement of the Megna towards Daoudnandy in Rennell's time would have beheaded this river, and made it a case parallel with that of the Teetas River. See Chapter XXI, page 96.]

Dackityah River.

121. *Map No. VIII A.*—This river rose East of Comillah, near the Goomty or Gomut River and entered the Meghna near Luckipour.

Map No. VIII B.—By the Navigation Map the river is shown as perennially navigable from the Meghna upwards to Hadjigunge, and thence as only navigable for a part of the year to Baagmarra, from near which place there was a cross country water route in the rainy season to Comilla—*Navigation Map*.

Road Routes.—Ferries are shown at Monohargunge, Baggrah and Roy-pour; whilst there was a ford at Dowlatgunge.

Navigation Map.—A route partly by two small Creeks and partly across country is shown between Chandpour on the Megna, and Mahabatpour on the Dackityah River. A cross country route, for rains navigation is also shown from Monohargunge on the Dackityah to Colinda (Map VIII B).

Little Fenny River and Daddana Creek.

122. *Map VIII B.*—The Navigation Map shows the Little Fenny River as perennially navigable from the sea to just above its junction with the Daddana Creek; and it shows the Creek as navigable for a part of the year to Colinda. Above Cossideah no information is forthcoming regarding the Little Fenny River.

Diary page 175.—The Daddana Creek was only passable at half tide, i.e., up to Colinda.

The tide flowed regularly in the Little Fenny all the year. As the Daddana was tidal up to Colinda [it is obvious that the Little Fenny was at least partially navigable for some distance above its junction with the Daddana Creek].

Navigation Map.—[The above assumption is emphasized as] the Navigation Map shows the small Creek joining Cossideah to the Little Fenny as perennially navigable.

Navigation Map and Water Routes.—These show a part-year route across country from Colinda westwards to Luckipour on the Megna River. The water routes show clearly that this route was only fit for "Pulwars" i.e., very small boats. I have therefore omitted the routes from Map VII B. [But the mention of "Pulwars" by Rennell is important since it shows that unless a route was navigable for decently sized boats, he took care to draw attention to that fact.]

Road Routes.—There was a ferry over the Little Fenny at Joogdya.

Fenny River.

123. **Navigation Map.**—This shows the river as perennially navigable up to the latitude of Cossideah (See Little Fenny).

Diary page 176.—At Cossoah the river was $1\frac{1}{2}$ miles wide and was widening daily in June 1765. Rennell was informed that a few miles above Cossoah the river was fordable at low tide.

Road Routes.—A ferry was maintained at Cossoah.

[Tidal navigation must have been possible for some distance above Cossoah.]

PART VII.

(*Rivers between the high land North of Dacca, and the Brahmaputra and Megna Rivers.*)

Luckya River.

124. *Map VIII A.*—This river flowed from Sagordy on the Brahmaputra to Simulya, where the Banar (or Western Luckya) met it.

Atlas Plate No. 35.—The length between Sagordy and Simulya had the alternative name of "Little Burrampooter"—*Map VIIA.*

Atlas Plate No. 35.—This plate shows the whole of the Luckya River on the scale of 3 miles to 1 inch; the Map is tolerably reliable for the situation in 1765.

Navigation Map.—This shows the Luckya as navigable always from the Meghna River upwards to Simulya; but from Simulya to Sagordy as only navigable for a part of the year.

Water Routes.—[These appear to corroborate the Navigation Map, as] the lower Luckya is given as the main water route Dacca to Chilmari.

Road Routes.—There was a ferry at Potalgunge, and another at Molaparah. No fords are recorded.

Navigation Map and Diary page 145.—From Simulya a creek (unnamed) ran South-Eastwards to Nursingdy on the Meghna River. It is shown as navigable on the Navigation Map; and Rennell says that he did not examine this channel, but "I cannot give any account whether it is all the year navigable for large boats, but I suspect that it is".

Balloo Creek.

125. This Creek rose in the high land North of Dacca but bifurcated above Derma (on the Luckya River), one branch running past Dacca into the Booryonga and the other to Demra.

Atlas Plate 35.—This map shows the course of the Lower Balloo on the scale of 3 miles to 1 inch and is tolerably reliable for details in 1766. On that map the Creek from Dacca is called the "Nuronda or Balloo Creek": [The Nuronda, however, is really a tributary (of the Baloo) which intersects Dacca.]*

Atlas Plate No. 58.—This Plate of the environs of Dacca (1774) shows much of the Balloo Creek. The branch towards Dacca is named Doozi Creek. The scale of the map is 2 miles to 1 inch and the map is reliable.

Navigation Map and Water Routes.—The Map shows the Balloo from Dacca to Demra as always navigable. The Water Routes show those lengths of the Balloo as on the main route Dacca to the Brahmaputra River.

Diary page 151 and Atlas Plate No. 58.—The Narunda was bridged on the road from Dacca to Cossimpour (North of Dacca). The bridge was called Umbari Bridge.

Little Burrampootry (or Poggolah) River.

126. *Map VIII A.*—This River passed from Bassimabo (on the Brahmaputra) to Nursingdy (on the Megna).

Navigation Map.—The River is shown as perennially navigable, but the route is not described in the "Water Routes".

Diary page 145.—The River is described as the nearest way from Nursingdy upwards, but is not definitely stated as always navigable. The current

* Diary page 151—Footnote by LaTouche.

was very rapid and the stream is described as a "large branch of the Baramputrey" [The inference is that the river was perennially navigable]. The tides were appreciable as far up as Pikerchoar, but not above that place (23rd May to 2nd June 1775).

Burrampooter Creek.

127. *Map No. VIII A.*—This Creek emanated by two branches from the Nursingdy-Simulya Creek and it flowed South till it met the Issamutty near its junction with the Megna River.

Road Routes.—There was a ferry at Sunergong. No other information is forthcoming about this river [but its name is suggestive of greater importance at an earlier time]. This Creek, it will be noticed, carries the name Brahmaputra far to the South, a fact which is commented upon elsewhere. (Chapter XX, page 94.)

The inter-relation between the rivers described immediately above (except the Balloo Creek) with the original course of the Brahmaputra is discussed under "Beheaded Rivers" (Dacca Mymensingh and Sylhet Rivers); in Chapter XXI, page 96.

CHAPTER X.

Rivers of Map IX.

Curumfullee (Karmaphuli) River.

128. *Map IX.*—It is upon this river that Islamabad (Chittagong) is situated.

Navigation Map.—This Map shows the river as navigable up to Islamabad; the Map shows no details of the river above that town.

Diary page 178.—"I am informed that the river is navigable for near 50 miles up."

- On Map IX I have followed the information given on the Navigation Map.

Water Routes.—These give the sea route from the estuary of the Meghna River (Map VIII B) to Islamabad. The route passed between Sundeeep (Sandip) and Bominy Island, and thence to the Islamabad River.

Fenny River.

129. This river is described with the rivers of Map VIII B (page 47).

CHAPTER XI.

Rivers of Maps XA and XB.

130. For the Hooghly and Ganges Rivers see special descriptions of these rivers, on pages 23 and 11.

For the rest I have first described the Upper and Lower Sunderbans routes from Calcutta to the Megna. Then those rivers for which soundings are recorded on the maps; and lastly rivers which are shown in the Water Routes or Navigation Map, for which soundings are not forthcoming.

131. The only rivers mentioned by name in this chapter are the following:—

Part I.—Tolly's (Surman's) Nala; Baliagot Canal; Salt Lakes; Channel Creek; and Rangafulla Creek.

Part II.—Bogybogy; Jamira; Mutwall (Matla); Roymungul (Roymangal) of Map XA; and Hissagorrah, Kanga (Murghatta) Bangara and Harighatta of Map XB.

The only rivers about which any information is forthcoming are coloured blue on the maps, [but, of course, many of the uncoloured rivers were perennially navigable in Rennell's time].

Part III.—Contains some general remarks upon the river system of the area covered by Maps XA and XB.

PART I.

Baliagot and Channel Creek Navigation Routes.

132. **Baliagot and Channel Creek Navigation Routes.**—These maps cover the Sunderbans area, and in many cases they show soundings. The soundings are in feet (at low water) in the Salt Lakes and in fathoms* (at low water) elsewhere—*Map XA and XB.*

The navigation of the Sunderbans was well known, and Rennell describes two main routes:—

(a) The Baliagot passage, from Calcutta through Tolly's (Surman's) Nala and Canal† to Baliagot on the Salt Lakes, and thence as is shown on Maps XA and XB, by the Northern dotted routes past Culna, Satalury and Conderpour (North-West of Dakhin Shahbazzpur) to the main Megna.

(b) The Sunderbans Route, which passed down the Hooghly to Channel Creek, and thence by the Southern dotted lines to Satalury, where this route met the Baliagot passage.

Navigation Map.—These two routes are shown as always navigable.

Memoir pages 259, 283 and 284.—The Sunderbans afforded a complete inland navigation "throughout and accross" the lower delta. Both the Baliagot and Channel Creek route passed through forest for over 200 miles. These passages were used during the whole year by those who went to and from the lower parts of the Ganges and Calcutta, etc.; and during the season when the Western branch of the Ganges was almost dried up ‡ the whole trade of Bengal (the Western Provinces excepted) passed either by Channel Creek or Baliagot, but chiefly by the former; some articles of the Company's cargoes being brought more than 900 miles by water at that season.

133. **Soundings in the Salt Lakes**—(*Map XA*).—The smallest sounding given is 3 feet, and is close to where the Canal between Tolly's Nala and Baliagot entered the Salt Lakes. Rennell's maps do not show the Canal,

* See addition in red near Salt Lakes (Map XA). The word "fathoms" appears there on the original Map but has not reproduced entirely on Map XA. A comparison with Ritchie's Maps of the Hooghly mouth give the same soundings at the head of Channel Creek as occurs on Map XA. Ritchie's soundings were in fathoms at low water.

† *Memoir Page 283, Edition 1788.* "The Baliagot passage opens into a lake on the East side of Calcutta; from whence within few years a small canal has been cut to join the lake with the river."

‡ [The Jellinghy or Bhagiat'i Rivers—or both those rivers.]

[which was constructed after those maps were made]. The next smallest sounding to that of 3 feet is $3\frac{1}{2}$ feet or 42 inches. [It may be presumed.] think, that boats of 42 inch draft could generally pass the 3 foot sounding point by the aid of the tides.]

But it is clear that the Salt Lakes afforded a temporary block to perennial navigation by boats of more than 300 maunds, and that [presumably] is why Rennell in the Memoir says that the Channel Creek was more generally used.

Water Routes and Maps X A and X B.—These show both routes, but do not show whether or not they were perennially navigable. The routes show the Salt Lakes as tidal; and the soundings recorded on the maps show that except in the Salt Lakes (at low tide) large boats could have proceeded everywhere else at all times.

Map X A.—It will be observed that the Rangafulla Creek, North of the Channel Creek is marked as an "Old passage" [Obviously therefore it was too silted up in Rennell's time to be of any use for perennial navigation].

PART II.

Other Rivers.

134. *Maps X A and X B.*—Three types of other rivers exist :—

(a) Those uncoloured on the Maps; regarding these no information is recorded, [but it is obvious that many of these Rivers were perennially navigable].

(b) Rivers for which soundings are recorded. The soundings show that these were perennially navigable, and the Rivers have been coloured accordingly on the maps.

(c) Certain rivers included in the Water Routes and Navigation Map for which soundings are not given on Maps X A and X B.

It will suffice to consider item (c) above in detail, commencing from the west :—

Bogybogy River.

135. *Map X A.*—From the Navigation Map this River was always navigable. The route is not given in the Water Routes. I have thought it safe to follow the former, the river being well within the tidal area.

Hissagorrah River.

136. *Map X B.*—This river entered the main Ganges Estuary at Dulya and it is shown as always navigable in the Navigation Map, but I cannot trace the river in the Water Routes. Being well within tidal limits I have followed the Navigation Map.

PART III.

General Remarks.

137. *Maps X A and X B.*—The water in the Sunderbans was everywhere salt (Memoir Page 283) but fresh water is recorded on Map X A at four places on the sea face and at one place on Map X B. [At present water on the delta face decreases in salt from West to East between Channel Creek and the Haringhata River. Presumably this is due to the main waters of the Ganges crossing the Delta on its Eastern side, the Rivers between the Hooghly and the Haringhata being decadent. If as time passes, fresh water increases or decreases along the delta face as described above, it may mean that fresh life is being given to the intermediate rivers or that they are becoming more decadent. The period of observation between Rennell's and the

present time perhaps is too short for purposes of observations of this type. But the matter should not be lost sight of. I am inclined to think (from experience on the Sunderbans Survey a few years ago) that the sea face now has less fresh water than in Rennell's time. Salt waters are recorded by Rennell on his maps only in the middle of the delta face between the Hooghly and Megna estuaries.]

138. *Map XA*.—"Codjee Deep" is shown south of the mouth of the Jumeerah River. [The "Swatch of no ground" is now much further to the East than this "Deep."] The position of the Codjee Deep was almost certainly fixed by Ritchie and cannot be much out [see "Ritchie," page 43 of my Memoir on the Surveys of Bengal by Major James Rennell 1917].

[If the "Swatch of no ground" has changed its position since Rennell's time, investigation of the causes of the change should be interesting.]

139. *Maps XA and XB*.—"In tracing the sea coast of the Delta, we find no less than eight openings, each of which, without hesitation, one pronounces to have been in its time the principal mouth of the Ganges" (Memoir page 266).

[The eight openings apparently were the Hooghly, Jamira, Matla or Mutwall, Roymangal, Kanga or Murghata, Bangra, Haringhata and the Megna. It is tolerably easy to trace the courses of these assumed rivers from the sea face to the northern margins of Maps XA and XB. A careful examination of Map XI might possibly throw some light on their original upper courses.]

Map XIVB.—This Map shows the topography of Map XA on the East in greater detail than appears on the latter Map.

Map VIIIB.—This Map supplements the topography of Map XB West of the Megna estuary.

CHAPTER XII.

The Rivers of Map XI.

140. For the Ganges and the Bhagirathi (Bogrutty) and Hooghly Rivers, see special descriptions of those Rivers (Chapter IV, pages 11-17 and 23-24, respectively).

The remaining Rivers are described as follows :—

Part I—Jellinghy River.

Part II—Comer Creek (or River).

Part III—Rivers between the Ganges and the Comer, viz. :—Gorroy (Gorai) Chunnah (Chandna) and Harigonga including the Hadgigunge and Sodderpour Creeks and the Haroilla River.

Part IV—Boyrab Creek (and river) including portions of the Issamot and Cobbaduck Rivers.

Part V—Rivers between the Hooghly and Boyrub, viz. :—Cobbaduck, Issamot, Gomoha, Batena, Pullayot, Mathabangha, Jabuna, Churnee (Churni) and Puttymahry Creeks.

Part VI—Rivers between the Boyrub and Comer, viz. :—Burrashee and Mudamatty; Damordah Creek; Nobogonga; Burrasaat; and Sittareeah Rivers, and the Manickdaw Creek.*

PART I.

Jellinghy River.

141. *Map XI*.—This River was a spill channel from the Ganges to the Hooghly River. It left the Ganges at Jellinghy village (Map XI) and joined the Hooghly at Nuddyah (Nadia). The evidence regarding the Jellinghy, as regards its navigability, is contradictory.

The river is shown as perennially navigable in the Navigation Map; in the Road Routes it is shown as fordable at Gooahree, Notyputah, Buxipour and at two points just below Jellinghy; and from other sources the river is shown to have been unfit for navigation at different times. It is necessary therefore to consider the full evidence of Rennell's work to discover the true state of the river in Rennell's time.

142. *Diary page 112*.—Rennell passed up the Jellinghy between 11th and 18th May 1764 in the smallest budgerow that he could obtain in Calcutta. He crossed the Buxipour shoal in 27 inches of water with difficulty and feeling his way. Three miles below Jellinghy village the river was so shallow that the boat was "scarce water borne". The river had risen 27 inches at Buxipour since the water began to rise. [Therefore at lowest water in 1764 the river must have been dry or very nearly dry at Buxipour and at some place about 3 miles below Jellinghy village]; and the budgerow cannot have drawn more than 2 feet 6 inches.

Memoir page 259.—"Although a stream runs in it the whole year it" [the Jellinghy] "is in some years unnavigable for 2 or 3 of the dryest months".

Diary page 115.—In December 1766, there was not less than 3 feet of water right through from Jellinghy to Nadia. [Therefore in the dry season of 1767 the river must have been practically dry in places.]

Road Routes.—In support of the above evidence we find the river fordable in the cold weather at several points.

Water Routes.—Route 122 (Calcutta to Patna) follows the Jellinghy River but it is neither recorded as a route perennially navigable, nor as one only navigable for a part of the year.

Navigation Map.—This map shows the Jellinghy as perennially navigable.

* [Now the site of the Alangkhalī (Ellenkhalī) River.]

It is therefore quite clear, from the evidence recorded above, that the Jellinghy was only navigable for a part of the year during Rennell's time and that the Navigation Map is in error in showing the river as perennially navigable.

In Map No. XI therefore, I have shown the Jellinghy as not navigable perennially.

Depth of the Jellinghy River.

143. *Diary*.—The Diary gives the following information:—

Maximum Soundings.

- (i) At Hautnagar (near Krishnagar) on 12th May 1764—13 ft.
- (ii) At Notydungah (Notyputah) on 14th May 1764—3 ft.
- (iii) At Panchda (Panchoterry) on 15th May 1764—7ft. 6 inches.
- (iv) At Buxipour on 16th May 1764—2 ft. 3 inches.
- (v) At Jagipour on 16th May 1764—6 feet.
- (vi) Three miles below Jellinghy village on 17th May 1764 not more than about 2 feet 6 inches (the maximum draught of the budgerqw), for a distance of about a quarter of a mile.
- (vii) Six to twelve miles below Jellinghy village on 17th May 1764, the river was wider and deeper than three miles below that village, and it ran very rapidly.

In addition to the above, several references are made to the extraordinary winding nature of the river in certain lengths, and to its uneven depth.

Obstructions in the river bed.

144. Rennell noticed serious obstructions in the river bed in May 1764—

Diary page 112.—(i) At Gawgatty (below Buxipour) 19 “large” salt boats were found sunk in the middle of the river.

(ii) At Veckrygunge* (above Buxipour) 9 or 10 salt boats were found sunk in the river bed.

Diary pages 118 and 119.—The size of these boats is not recorded, but Rennell mentions two very large salt boats of 3500 and 4000 maunds, which respectively drew 6 feet 9 inches and 7 feet 1½ inches. [But even if the boats found by Rennell in the bed of the river were of much smaller size than those described here, in the quantities noticed by Rennell, they must have had serious effect upon the régime of the River, at least near Buxipour.]

Width of the Jellinghy River.

145. *Diary page 111*.—(i) At Hautnagar (above Kishenagar) on 12th May 1764, the river was 150 yards wide and would be 270 yards wide in the rainy season.

(ii) Between Notyputah and Panchoterry on 15th May 1764, the channel, in places, was “not five yards over.”

(iii) At Panchaterry the river was 200 yards wide on 15th May 1765.

(iv) Three miles below Jellinghy village the river was very narrow but widened out considerably between the 6th and 12th miles below that village.

Height of River banks and periodical rises in water level.

146. *Diary page 111*.—(i) At Hautnagar (above Kishenagar) the river would probably rise 13 feet above its level of 12th May 1764.

(ii) At Panchaterry it would probably rise 26 feet above the level on 15th May 1764.

(iii) *Diary page 112*.—At Buxipour on 16th May 1764, the water surface was 2 feet 3 inches higher than it had been at lowest water in 1764.

(iv) *Memoir page 171*.—The rise in the Ganges from lowest to highest water, near the Jellinghy River head, was normally 31 feet.

(v) *Diary page 111*.—The distance between points (i) and (ii) above was 41 miles and the rise above lowest water increased from Nadia upwards as the Ganges River was approached.

Fall in bed of river per mile.

147. *Memoir page 260*.—Between the Jellinghy and Bhagirathi Rivers a line called "Mr. Call's Line" will be found on Map XI. The general fall of the country, from North to South, along this line, was 9 inches per mile, after due allowance was made for curvature. But owing to winding in the river bed, the fall in it was reduced to 4 inches per mile. [It is not clear if this latter refers to the Jellinghy or the Bhagirathi River, but most probably to the latter.]

Shape of off-take head of Jellinghy.

148. *Map XI and Atlas Plate 1*.—It will be observed that the Jellinghy turns directly to the West as it takes off from the Ganges; and that similar curvature exists in the uppermost reaches of the Comer Creek (Mayescunda); Gorroy River (Custee); Chundna River (Moddapour); and Pabna Creek. The significance of the similarity of these off-takes in that they take off in directions opposite to those of the Ganges River [is worthy of special examination.]

Movements in the head of the Jellinghy.

149. *Memoir page 261*.—Between 1764 and 1776 the Jellinghy head moved three quarters of a mile down stream [Ganges].

PART II.

Comer Creek.

150. *Map XI*.—This River left the Ganges at Mayescunda (below Jellinghy village) and its course is described below from Mayescunda Eastwards and Southwards until the Creek meets the Ganges below Hobbygunge. [The earlier part of the course of the Comer is now known as the Matha-bangha.]

Atlas Plate No. 1.—Rennell shows the Comer as leaving the Ganges and as dry about a quarter of a mile below its off-take.

Diary page 113.—On 23rd May, 1764, the River was 3 feet deep at its off-take and "almost" dry a quarter of a mile further down.

Road Routes. There were fords at Bagan and Baxipour, and until Sopokoopah is passed, beyond the fact that the river was not perennially navigable in its proper reaches [a fact established by the river being dry or nearly dry in May just below its exit from the Ganges], Rennell gives no other information about this portion of the River.

Atlas Plate No. 32.—This Plate gives soundings in cubits at lowest water from about one mile above Mokrapour to Burasaat.

At Fazerypour sunken boats are recorded and soundings of a creek running to a jheel.

At Awaypour there were only $1\frac{3}{4}$ cubits of water in the dry season.

Alpapour Creek (near Boyrah) which joined the Comer with the Gorroy River, was dry, about $1\frac{1}{2}$ miles from Boyrah, but had deep water on the Comer side.

Below Awaypour there was never less than 9 cubits of water in the dry season, but sunken boats were found in the river just below Serrypour.

At Burrasaat the water was 40 cubits deep at lowest water.

151. From the above it is clear that the Comer was perenially navigable from Awaypour to Burrasaat, although it is only shown as navigable, in those reaches, for a part of the year in the Navigation Map, [a discrepancy which seems due to the small scale of that Map].

Atlas Plate 32 was made in July 1764, and is in the scale of 2 inches to 1 estimated mile. The Plate is a "Sketch" and not a map.

Diary page 121.—At Fazerypour a Creek runs South, from the Comer to a jheel, and the Creek was not navigable in the dry season, which really means that through navigation Southwards was not possible in that season.

Diary page 121.—At Awaypour, on 19th July, 1764 Rennell found $10\frac{1}{2}$ cubits of water, and that the rise since lowest water had been 8 cubits.

Diary page 121.—The Comer was 150 yards "over" on 18th July 1764.

Diary page 120.—The Alpapour Creek referred to above in the description of Atlas Plate No. 32, is given the name Comer in the Diary; the water of this Creek was black in July 1764 and the stream was not perennially navigable. The country round Boyrah was inundated on 19th July 1764.

Atlas Plate No. 31 (2 Parts).—Scale 500 nautical yards to 1 inch surveyed by Rennell in July 1764, shows the Comer, with soundings, from Burrasaat to Hurryapour (where the Burashee leaves the Comer). At Burrasaat the water of the Comer from the West of Burrasaat all flowed down the Burrasaat River, which also absorbed the water of the Comer from Hurryapour. In other words from the Ganges to Burrasaat we have followed the Comer, but between that place and Hurryapour, this description goes against the current of the Comer. [This anomaly is considered in further detail later on.]

At Lettydoman the main waters of the Gorroy joined the Comer, which at that point was 17 cubits deep at low water. And elsewhere between Burrasaat and Hurryapour there was never less than 8 cubits of water at lowest water.

152. The Comer, therefore, in the length here discussed, was navigable all the year round, although not so shown in the **Navigation Map**.—But as the Diary (see below) corroborates perennial navigation, I have shown this length of the Comer on Map No. XI as always navigable. It should be noted that Rennell called the river here described the Comer although the currents reverse at Burrasaat.

Diary page 120.—There were always 34 to 8 cubits of water in the dry season between Burrasaat and Lettydoman, and the current was very rapid. These figures agree with the soundings on *Atlas Plate No. 31*.

153. *Diary page 120.*—Between the Lettydoman and Hurryapour in July, 1764 Rennell found from 14 to 21 cubits of water. Allowing for a seven foot rise since lowest water, there would therefore never be less than 7 cubits of water at any point. It will be observed that there is a discrepancy of 1 cubit between the figures given in the Diary and the soundings recorded in Atlas Plate No. 31 between Lettydoman and Hurryapour. This discrepancy is not serious [which is as well, since it is nowhere explained by Rennell].

Diary page 120.—At Lettydoman the main arm of the Gorroy (Lettydoman Creek) had a general width of 70 yards, and its water was quite black on 13th July 1764.

Diary page 119.—Between Hurryapour and Mutrapur (still against the current) the river was much narrower than the Chundnah (i.e., much less than 200 yards wide) and very deep; unfortunately Rennell has left no special map of these reaches. This length of the river is shown as perennially navigable on the Navigation Map.

Diary page 122.—The water at Mutrapour rose 3 feet between 10th and 27th July 1764.

Diary page 119.—The length of river between Hurryapour and Motrapour was called the Comer in Rennell's time (10th July 1764).

Road Routes.—A ferry was maintained at Motrapour.

154. *Atlas Plate No. 29* shows the Comer, but only roughly sketched, from Motrapour *viâ* Connipour to Cardya, a distance by river of some 41 miles. *Atlas Plate No. 30* shows that from Motrapour Eastwards the Comer reverses its flow, and again takes up the direction of flow used in its earlier reaches (down to Burrasaat) in 1764.

The fact that the Comer River as here described had a continuous name in 1764 from Ganges to Ganges, is [conclusive evidence that the river once flowed continuously from Mayscunda to near Hobbygunge. The issue is not confused by the existence of other rivers of the same name anywhere along the course of the Comer as described by Rennell; to this there is one negligible exception namely the Creek at Boyrab which joins the Gorroy to the main Comer, a Creek which is less than 3 miles in length. But from Motrapour to Burrasaat in 1764 the current is reserved in what was apparently the old bed of the Comer River.

It is beyond the scope of these notes to discuss how the Comer became be-headed in this way, but it is obvious that either the Gorroy or the Chundnah—or both—were responsible for the change in course; helped, quite possibly by a local change in direction of general drainage].

Atlas Plate Nos. 29 and 30 show the Comer from Motrapour to near Hobbygunge, where the river enters the Ganges; both maps are mere sketches; the last reaches of the Comer, however, were not specially mapped by Rennell; so far as the Comer is concerned *Plate No. 30* ends at Calamery and follows the Creek joining that place to Hobbygunge. The Comer, from Motrapour to Calamery was only navigable for a part of the year, although at lowest water places on it became dry—but generally from about the latter end of May. From Calamery to Hobbygunge the Creek mentioned above was navigable for a part of the year only.

155. Following the Comer from Motrapour Eastwards, shortly before Connipour is reached a small Creek gave access to the Harrigonga for a part of the year, by which the Ganges could be reached in one day (*Atlas Plate No. 29*).

Diary page 122.—It is stated that the Creek just mentioned was not examined, but it is clear from *Atlas Plate No. 29* that the Creek was sometimes navigable.

Diary page 192.—The general width of the Comer from Motrapour Eastwards was about 160 yards, but in February 1767, the water was only 40 to 50 yards wide, and, in places, the River was scarcely knee-deep. The course was remarkably winding and the river was navigable for large boats from mid-July.

156. **Road Routes.**—Ferries were maintained at Gopalpour and Jaynagar; and there were fords at Tingracally and Modrapour—to Hobbygunge.

In concluding this examination of the Comer River, it may be said that [probably] between Mayescunda and Awaypour there were considerable stretches of river always navigable; but because of the blocked beds near Mayescunda and Awaypour, Rennell made no careful investigation. The state of the River from Burrasaat to Mocrampour as described by Rennell shows that in those reaches the Comer was far more alive as a river in 1764 than from Modrapour Eastwards. From Burrasaat to Motrapour the Comer had ceased to be an active river previous to 1764. [And from Motrapour to the Ganges the river was dying fast, because the Chundnah at Motrapour had robbed it of most of its water.]

157. *Diary page 194.*—We have followed the Comer to the Buderation Creek which flowed from the Ganges at Chanduchar to Jaffierabads. On this Creek Hobbygunge is situated. The Creek was always navigable for the largest boats. It was 150 yards wide at its offtake from the Ganges, but only a

quarter of a mile wide below Hobbygunge. The narrow Creek joining it to the Ganges from Jaffierabad was always navigable. (For description of continuation southwards of the Hobbygunge Creek to Sullaputty, see Ganges River Section IV, Chapter IV.)

158. Navigation Map.—The Haroilla River left the Ganges opposite Saddurdey and joined the Budarashan Creek near Hobbygunge. No information regarding this Creek is available except that the Navigation Map shows it as navigable for a part of the year; and from the Diary, [inferentially] (*Diary page 129*), it was so navigable. The Creek is connected with the Ganges some eight miles below its exit from that River by a Cross Creek which passes Sodderpour; as far as Sodderpour no information is available (*Diary page 129 and Navigation Map*), but thence to the Ganges, by the North-East and South-East channels coloured on Map XI there was always perennial navigation.

PART III.

Rivers between the Ganges and the Comer.

159. Gorroy River.—The Gorroy River (or Gorai) left the Ganges three-quarters of a mile below Custee (*Map XI*) and joined the Comer at Lettydoman, but threw out a minor channel connecting with the Comer at Boyrah; and later on another similar channel at Sasilpour. From near Columbery downwards, by the main course, in Rennell's time, the Gorroy was known as the Bacout, Culsedaw and Lettydoman Creeks.

160. Atlas Plate No. 1.—This map made by Rennell between 1st and 17th June 1764, shows the Gorroy (Custee Creek) on the scale of 507·5 yards to 1 inch, down to its first main bend, where less than 2 cubits of water (at lowest water) are recorded. But at the exit, soundings of 20 to 40 cubits are shown.

Diary page 115.—On 3rd June 1764 Rennell was informed that the Gorroy was navigable perennially throughout its course; but upon examining it he found on 9th June 1764, that it was very shallow indeed about $1\frac{1}{4}$ miles from its head. The river had risen 4 feet since lowest water, and the soundings obtained at the low bar were only 4 to 5 cubits. Rennell was informed that in the dry season sometimes there was insufficient water at the bar for loaded 90 maund boats. The Gorroy near its head was from 130 to 200 yards wide, and a quarter of a mile down, 10 to 40 cubits deep.

From the above it seems clear that although navigation was obstructed at low water in 1764, the obstruction was of varying intensity, [which probably led to the first information given to Rennell, viz : that the river was perennially navigable].

161. Atlas Plate No. 26.—This Plate shows a special survey from the Ganges to the bar, scale 200 yards to 1 inch; and gives soundings at low water. The survey was made on 9th June 1764, and it can be taken that an addition of 4 feet to the soundings will give the true depth of the water on that day.

162. Road Routes.—The River was fordable at Comercally.

163. Atlas Plate No. 33.—No other information is available about this river until Columbery is reached; from that place till the river bifurcates, it was known as Bacout Creek; then as the Culsedaw Creek to near Gawracutta; and lastly as the Lettydoman Creek thence to the junction with the Comer River.

The Creek at the junction of the Bacout and Culsedaw Creeks, was known as Comer Creek, and was only navigable for a part of the year, as also was the Creek from Sasitpour to the junction of the Culsedaw and Lettydoman Creeks.

164. Diary page 122.—The Gorroy was always navigable from Columbery to its junction with the Comer, and often the whole river, from the Ganges to the Comer, was navigable for 300 maund boats from the end of May onwards.

165. Navigation Map.—This map shows the whole river as only navigable perennially for a part of the year. But that map cannot be allowed to supersede the information given above regarding the Columbery-Lettydoman reaches.

166. Chundnah River.—This river is also called the Chunnunah and Maudapour (Moddapour) Creeks (*Map XI*). The River leaves the Ganges at Moddapour and joins the Comer at Motrapour and was always navigable in Rennell's time.

Diary page 117.—On 21st June 1764, the head of Moddapour was 250 yards wide and nowhere less than 6 cubits deep. This depth refers to lowest water.

Diary page 118.—Since lowest water the river had risen 5 cubits by 21st June, 1764.

167. Atlas Plate No. 5.—Soundings at lowest water are given for about 4 miles of the river below Moddapour; for that length the river seems to have been surveyed tolerably accurately on the scale of 507·5 yards to 1 inch between 18th and 21st June, 1764.

In these 4 miles the lowest water depths varied from 6 to 25 cubits, and a tree is marked as lying in the river bed just below Moddapour (Maudapour on Atlas Plate No. 4).

168. Diary page 118.—For 30 miles below Moddapour at lowest water, depths varied from 6 to 50 cubits, and the River was about 200 yards wide and of very regular width. But between miles 21 and 30 the river bed was very crooked, 9 miles of circuitous bed only covering 2½ miles in direct distance.

Diary pages 118 and 119.—The river from 30 miles below the Ganges to Motrapour, on 5th July, 1764, could pass vessels drawing at least 6 feet 10 inches of water.

169. Diary page 119.—About 2½ miles above Motrapour the water had risen 6 cubits since lowest water, on 8th July, 1764; and 7 cubits at Motrapour on 9th July, 1764. The water at Motrapour rose 3 feet between 10th and 27th July, 1764.

Diary page 119.—It appears that Rennell made a special survey of the Chundnah, but beyond the 4 miles shown on Atlas Plate No. 4, no record of it—on its original scale—exists.

170. Diary page 119.—At Motrapour the name Chundnah is lost, and the Comer River is met.

171. Road Routes.—Ferries existed at Moddapour, Beherpour and Motrapour, whilst the stream connecting the Chundnah (at Jamalpour) with a jheel on the East was fordable between Nolluah and Jamalpour.

Navigation Map.—This shows the Chundnah navigable from Moddapour to Motrapour.

172. Harrigonga River.—This river leaves the Ganges at Calkapour (South of Rottingunge) and proceeds Southwards and then Eastwards until it reaches the Hadgigunge Creek, which connects with the Ganges. Rennell has left no record of a special survey of this river.

173. Atlas Plate No. 5.—This Plate (on the scale of 507·5 yards to one inch) shows the exit of the Harrigonga from the Ganges, but gives no soundings; on the face of the map is a remark that the Creek leads to Hadgigunge and Boostnah and always contains 3 cubits of water in the dry season. [This information apparently was hearsay information, obtained as Rennell passed down the Ganges, and it was inaccurate. On other occasions Rennell has been given similar inaccurate information.

Road Routes.—The River was fordable at Cameldy (Camaldihiy).

Navigation Map.—The River is shown throughout its length as not perennially navigable.

174. Diary page 126.—The Harrigonga was connected with the Comer near Ambory, by a small stream in which there were only 1½ cubits of water

in dry weather, but which was navigable for a part of the year. To reach Boostnah from the Ganges, by the Harrigonga, this stream must have been used. Therefore the remark on Atlas Plate No. 5 that there were always 3 cubits of water through to Boosnah is contradicted by the Diary.

175. *Diary page 192.*—In February, 1767, the Harrigonga bed was from 200 to 250 yards wide, but in many places too shallow for boats of moderate size.

The evidence of the Diary therefore is so conclusive against perennially navigable conditions in this river, that I have followed that evidence on Map No. XI.

176. The Harrigonga joined a Western channel of the Ganges at Hadgigunge. This arm left the main river at B on Map XI and rejoined it opposite Saddurdey.

Diary page 128.—The Hadgigunge Creek was always navigable from the point B and thence perennially navigable for 600 maund boats. The channel was 600 yards wide.

PART IV.

Boyrub River.

177. *Map XI.*—This River flowed out of the Jellinghy from Moshydunga, (some 12 miles South of Jellinghy village) whence its course can be traced to Damordah, at which place the name Boyrub is lost. To Damordah the river described was called *Boyrub Creek*.

From Damordah, the Issamot and Cobbaduck Rivers flow past Muttyara and Moishpour to Sonapurrah, where the name Boyrub reappears as the *Boyrub River*, and can be followed without a break, South-Eastwards to its junction with the Ballisore River. For convenience of explanation I have treated the above lengths of River as one River; [in fact there seems reasonable ground for thinking that the portions of the Issamot and Cobbaduck Rivers included herewith the Boyrub are not far from some original and old bed of the Boyrub].

178. **Navigation Map.**—From the Jellinghy to Moorley the River was only navigable for a part of the year; from Moorley to the Ballisore River it was always navigable.

Road Routes.—Several fords are recorded between the Jellinghy and Moorley and none below Moorley. Ferries are recorded downwards from Jessore (near Moorley) at several points.

Water Routes.—These agree with the Navigation Map.

179. *Diary page 189.*—Tides did not extend as far up as Neelgunge, above Moorley. At Neelgunge on 19th February, 1767, the river was very deep and 90 yards wide. But below Neelgunge, the river was shallow in many places.

The predominance of evidence is clearly that the River was perennially navigable as far up as Moorley, and it may be noted that although declared to be very shallow below Neelgunge, no depths are given nor does Rennell say that the river was so shallow as to obstruct perennial navigation.

PART V.

Rivers between the Hooghly and Boyrub Rivers.

Cobbaduck River.

180. *Map XI.*—[For description of Section between Muttyara (junction of Issamot and Cobbaduck Rivers) and Sonapurrah, see description of the Boyrub River.]

Section II.—Sonapurrah to near Teecha.

181. This section of the River flows South from Sonapurrah to the margin of Map XI. The River continues partly through Map XA and its third section is described with the Rivers of that Map (Chapter XI).

Navigation Map.—This shows the River as navigable always for the whole of this section.

Road Routes.—Ferries, but no fords, are recorded, south of Sonapurrah.

182. *Diary page 189.*—The river was always navigable from Jinger-gutchta to the sea for the largest boats. The tide flowed up above this place on the 17th February 1767 and the River there was about 130 yards wide on that day, where the ferry crossed.

Issamot River.

[The first section of this River has been described under the Boyrub River.]

Map XI.—Section II. Muttriaræ to the Jabunah River (Southern margin of Map XI).

183. **Navigation Map.**—This Map shows the River as only navigable for a part of the year from Muttyara down to Bongong; but from Bongong downwards as perennially navigable.

Road Routes.—Several ferries, but no fords across the River, are recorded.

184. *Diary page 188.*—At Bongong on 11th February 1767 the River was 160 yards wide and 12 cubits deep. It was not navigable for *large boats* until some time after the waters had begun to rise in the seasonal rise after lowest water. The tide on the day given above rose 18 inches at Bongong.

[It is not clear what the above reference to navigation covers. In the rest of the Diary it is clear that when large boats are spoken of, boats of considerable size and draft are referred to. Further it is not clear if Rennell was writing of the channels above, or below Bongong, or for the whole river. I have therefore adhered to the evidence of the Navigation Map in colouring Map XI.]

185. **Road Routes.**—There was a ford at Damordah but no fords are recorded lower down; several ferries below Damordah are recorded.

Miscellaneous Creeks.

Gumoha Creek.

Map XI.—(Between Serampour on the Hooghly and the Issamot River).

186. *Diary page 187.*—The ford at Gomoha was nearly dry on 9th February 1767; the river was deep and rapid in the rains.

Batena Creek.

Map XI.—(Between Bongong on the Issamot and Jinger-gutchta on the Cobbaduck River).

187. *Diary pages 188 and 189.*—At Jaddopour on 16th February 1767 the river was 160 yards wide and four feet deep.

Pullagot Creek.

Map XI.—(Three miles west of Moorley on the Boyrub River).

188. *Diary page 189.*—There was a ferry at Chanferah. On 19th February 1767 the stream was there very slow. The river was fordable lower down.

Mathbangah Creek.

189. *Map XI.*—This Creek was a lower extension of the Pallagot Creek (see immediately above). No information is available regarding the Creek but its name and its course. The name however is identical with that of the present name of the Upper Boyrub River. [The course of the Creek as shown by Rennell suggests that it may once have been occupied by the Boyrub.]

Jabuna Creek.

190. *Map XI.*—This Creek flowed out of the Hooghly River from below Hooghly and joined the Issamot at Savashpour.

Diary page 187.—At Mullicpour on 10th February 1767 the river was 3 feet deep, but it was navigable for the largest boats in the rains.

Navigation Map.—This shows the river as navigable for a part of the year.

It will be noted that the name of this Creek re-occurs on the southern margin of Map XI. [The case may be one of beheading of the Jamuna by the Issamot River.]

Chournee Creek (Lower Mathbangha).

191. **Navigation Map—Map XI.**—This Creek is shown as navigable from below Santipour where the Creek entered the Hooghly River, up to Kishenagur where the Creek flowed out of the Issamot River.

Memoir page 259.—[The Creek apparently was not considered as a reinforcement of much value to the Hooghly River.]

Putymahry Creek.

192. This Creek flowed into the Jellinghy River just below Putymahry, from a lake.

Navigation Map.—A rainy season route is shown from below Putymahry to Bagwan, the last two miles [apparently] being across country.

PART VII.

Rivers between the Boyrub and Comer Rivers.

Burrashee and Mudamutty Rivers.

193. *Map XI.*—This [combined] River was a continuation of the Chundnah River and it took off from the Comer, West of Boosnah, from the Western end of the reaches of the Comer (see description of Comer River) [which reaches appear to have been usurped by the Chundnah River]. The Burrashee ended at Colna where it combined with the Nobogonga (from the West) and formed the Mudamutty (Madumatti) River which flowing South, by combination with the Boyrub River, formed the Ballisore River.

194. **Navigation Map and Water Routes.**—By this Map this [combined] river was always navigable from the Comer to the Ballisore.

Road Routes.—Ferries are recorded across the River, but no fords.

195. **Map XI and Road Routes.**—On the West of the Burrashee, from Mahmudpour Southwards, a chain of jeels occurred and the stream joining the two upper depressions was fordable at Mahmudpour.*

Map XI.—The greater part of the Mudamutty River ran through very low country.

* [This chain of jeels now forms the bed of an important river and is an illustration of a river moving from higher to lower ground. The inference is possible that the lower ground had been omitted from former building operations by rivers, but is no means certain].

196. *Diary page 191*.—At Daogotty (South-West of Jaynagur) on February 23rd 1767 the Burrashee was 50 yards wide at the ferry, but very deep and was always navigable (through to the Ganges by the Chundnah River).

Damordah Creek (from the North-East) from the Comer River to Damordah at the junction of the Boyrub and Issamot Rivers.

197. *Map XI*.—This Creek is unnamed, but was the parent of Nobogonga River.

Road Routes and Navigation Map.—No information is available regarding the River except that it was fordable in one place, and was navigable for a part of the year.

Nobogonga River.

198. *Map XI*.—This river flowed from the Damordah Creek Eastwards to Magroh, where it was reinforced by the Burasaat River. The Nobogonga then turned Southwards and joined the Burrashee at Colna. Some six miles East of Damordah the River bifurcated, the Southern channel being known as the Sittarreah River.

199. **Navigation Map**.—The River was navigable for a part of the year for the first six miles East of Damordah; thence to Magroh the River is not shown; from Magroh to the Burrashee the River was always navigable.

200. *Diary page 191*.—On the 22nd February 1767 the tide rose "near 3 cubits at Puttya" * (below Magroh). On the same day the River was 140 to 180 yards wide at Pidtyah and deep and rapid.

The River was always navigable up to Magroh.

Road Routes.—A ford is recorded at Jennidah, but no ferries.

Burrasaat River.

201. This River joined the Nobogonga at Magroh, flowing South to that place, from the Comer River.

Navigation Map shows the River as always navigable.

Diary page 191.—Corroborates the Navigation Map.

202. *Diary page 12*.—The River was 13 to 14 cubits deep on 17th June 1764 for the 2½ miles above Modapour.

Atlas Plate No. 31.—This plate shows a portion of the Burrasaat River with soundings near its head. The soundings are in cubits at lowest water. The Map is probably tolerably accurate. The scale of the map is 507·5 yards to 1 inch.

Sittareeah River.

203. This River left the Nobogonga at Arakpora, six miles East of Damordah. Near Nuldingah the River bifurcated, its two channels meeting again near Goracally, where the Sittareeah terminated.

204. **Navigation Map**.—This shows the River as navigable for a part of the year down to Nuldingah, and as perennially navigable thence downwards. But the scale of the map is too small to indicate which of the bifurcated channels is referred to.

205. **Road Routes**.—Fords are recorded at Nuldingah and at two places above it; there were several ferries below Nuldingah, one being on the Northern bifurcation at Gunagotty.

206. *Diary page 90*.—On the 21st February 1767 Rennell crossed the southern bifurcation at Daccutee and found the River about 200 yards wide

and very deep. But not tidal. The same day he crossed the Northern Channel at Gunagotty, where he found it tidal; further he found the Creek $1\frac{1}{2}$ miles East of Gunagotty to be tidal, and 4 feet deep at high water. There must therefore have been appreciable tidal rise at Gunagotty, and it seems clear that the northern bifurcation was the more important; [therefore, presumably, the Navigation Map refers to the Northern channel but it is possible that both channels were perennially navigable].

Water Routes.—The route through the Sittareeah is not recorded.

Manickdaw Creek.

207. *Diary page 191 and footnote by La Touche.*—This Creek lay between the Nobogonga and Burashee Rivers; it passed $1\frac{1}{2}$ miles East of Mahmudpour on the road between that place and Jaynagar. At the crossing Rennell remarked that it was "very shallow".

[This Creek is interesting as the main Alangkhali (Ellenkhali) River now occupies the rough alignment of the old Manickdaw Creek.]

CHAPTER XIII.

Rivers of Map XII.

208. For the Ganges, Attri (Attrai),* Curratty (Karatoya),† and Brahmaputra, see special descriptions of these rivers (Chapter IV).

For the Mahananda see river descriptions in Chapter V; Purrabubah those in Chapter VI; Goggott those in Chapter VII; and Conoi those in Chapter IX.

The Rivers described in the chapter are :—

Part I.—Rivers between the Mahananda and Attri, viz : Barruly, Nar-rud, Burreyl, "Dead" Creek; and Pubna (Pabna) Creek.

Part II.—Issamutty and Joobnee Rivers (described as one river); and the Bengala—Monaash River.

Part III.—Rivers East of the Issamutty and Jubnee viz : Jenni Jenai‡ Boicecally, and Dewangunge Rivers.

Part IV.—River between the Issamutty, Joobnee, and Curratty—Foolju—Bodussey Rivers viz : the Coni.

Part V.—Rivers between the Curratty—Foolju—Bodussey and the Attri viz : Goor, Baganady,§ Balesar,§ Billabokey§ and Currinja,§ Barally, Nagore and Nagorcally Creeks.

PART I.

Rivers between the Mahananda and Attri (Attrai).

Barruly River.

209. *Map V.*—This River rose near Balloogaut (on the Attri River) and was known as Moidunder River as far down as Limbobarya where it was joined by an effluent from the Attri.

The joint Rivers then passed due South along a succession of Jeels, which culminated in the Comer Jeel which lay on the South of Comergong.

At Mohatta the river turned due East and joined the Attri (near Burrumpour) some eight miles North of Nattore.

There is no information available for the reaches of this River above Limbobarya.

210. **Navigation Map and Water Routes.**—From that place to near the Southern end of the Comer Jeel, the Navigation Map shows the River as navigable for a part of the year only. But the route is not given in the Water Routes.

Thence, past Nohutta to the Attri, the Navigation Map shows the River as always navigable, but the Water Routes record nothing regarding these reaches of the river.

Road Routes.—From Limbobarya to the Attrai there were ferries at Comergong, Mootyhan and Burrumpour. No fords are recorded.

211. *Map XII.*—[The succession of Jeels between Limbobarya and Nohutta are suggestive. They lie along the edge of an elevated tract; two rivers (Attri and Barruly) both turn from due North and South courses, almost to due East, in this vicinity.

It will be observed that Rennell shows two connections with the Ganges (West of Nohatta) which perhaps represent the remains of an early course of

* Under Tista River.

† Including Foolju and Bodussey Rivers.

‡ Including the Lojong River, Map XII.

§ Described under Goor River.

the Barruly through the silk industry country near Rampour Boaleah. If jeels represent old beds of rivers (and it will be noted that Rennell held that view as regards the Chalan Beel area) the inference is that the Barruly was once a far more important River than it now is.]

Narrud River.

212. Map XII.—This effluent of the Ganges left that River near Rampur Bauleah, flowed East, and passing Pootyah and Nattore, flowed into the Attri River at Durrah.

Navigation Map and Water Routes.—These agree in showing this River as navigable for a part of the year only to Nattore, and thence the Navigation Map shows the river as perennially navigable.

Road Routes.—There was a ferry at Rampour Bauleah and a ford South of Pootyah.

Burreyl River.

213. Map XII.—This river flowed out of the Ganges at Surdah, and running Eastwards, joined the Attri at Jearkerlah (near Chuppalyah).

Water Routes and Navigation Map.—These agree in showing the River as navigable for a part of the year throughout its whole course.

Diary page 183.—The River was only navigable for a part of the year.

Atlas Plate No. 56.—For the course of this River this Atlas Plate should be followed in preference to Map XII.

Dead Creek.

214. This Creek left the Burreyl South of Malunchee (Malunchi) and joined the Attri some seven miles West of Chatmol.

Road Routes.—No information is available regarding the Creek except that there was a ferry across it at Laudanna.

Atlas Plate No. 56.—The course of this Creek is more correctly shown on this Atlas Plate.

Pubna Creek.

215. This Creek passed out of the Ganges at Pubna and joined the Attri (Attri) near Boolbarrah.

Navigation Map and Water Routes.—The Creek was always navigable.

Diary pages 126 and 182.—The Creek was 150 to 300 yards wide in November, 1766, and was serpentine. It was commonly used all the year round by the largest boats in preference to the main stream of the Ganges. The bed had few sands in it.

Atlas Plate 56.—The Plate should be consulted in preference to Map XII.

PART II.

Issamutty and Joobnee Rivers.

216. Map XII.—The Issamutty was an effluent of the Curratty River, leaving the latter near Seebgunge. No information regarding the upper reaches is available except that the River was fordable at Caddi (North-West of Dunoot). Below this point the River flowed South-East to Cauleah, then turned East past Nulshi-Imaumpour to Dubya. Thence it flowed almost due South to its junction with the Dollasserry, just West of Baljuree.

217. Road Routes.—Between Dunoot and Baljuree several ferries, but no fords, are recorded.

The course past Nulshi-Imaumpour belonged partly to the Comi River and partly to the Bonecally River and the stream flowed from East to West.*

Below Dubyah the River was known as the Joobnee River to the junction with the Dollaserry River.

Navigation Map.—This shows the River as always navigable from the Dollaserry River upwards, to the junction of the Issamuty River with the Monaash.

Water Routes.—These give the routes shown in the Navigation Map, but do not refer specially to perennial, or part-year, navigation.

Monaash River.

218. Map XII.—The Monaash River flowed from Tengua on the Goggott River† by two channels (Monaash and Bangallah) which united at Nockeelah. Thence to Dunoot, where it joined the Issamuty River.

Navigation Map.—This shows both channels and the rest of the River as perennially navigable.

Water Routes.—These agree as regards the Monaash between Tengua (*via* Modargunge) and Dunoot, but the route through the Bangallah is not recorded.

Road Routes.—A ferry is shown over the Bangalla at Tengua, and over the Monaash at Rogadaw Gaut. No fords over either river are recorded.

PART III.

Rivers East of the Issamuty and Joobnee Rivers.

Jenni (Jenai) and Lojung Rivers.

219. Map XII.—This River took off from the Brahmaputra junction Singjanny (Singhjani) and flowed past Mohungunge, Beerbarry and Badeyl, South of which place its name disappears from the map and for the purposes of explanation, I have assumed its original course [if it ever had such a thing] to have followed that of the Lojung River past Soya, Caugmahry, Attyah, Baubunparah and Baljuree to the Dollaserry (Dhaleswary) River.

220. Navigation Map.—This shows the River as navigable for a part of the year from the Brahmaputra down to Caugmahry; and thence as navigable for the whole year down to Baljuree.

Water Routes.—These agree with the Navigation Map as far up as Attyah, but show the reach Caugmahry to Attyah as only navigable for a part of the year; from Attyah to Baljuree the route is given but no reference to its perennial or temporary state of navigation. The route above Caugmahry is not given in the Water Routes.

Road Routes.—There were fords at Hadgipour (South-West of Singjanny) at Caugmahry, Suntosh and Attyah. No fords are recorded below Caugmahry. [I have therefore taken the river to be perennially navigable as far up as Attyah only.]

221. Atlas Plate No. 23.—This Plate shows the offtake of the Jenni River from the Brahmaputra River (*vide* the second reference to Atlas Plate No. 23 under Section II Brahmaputra River—Chapter IV, pages 18—21.)

* [I have merely assumed that the Issamuty and Joobnee were the same river for convenience of description.]

† This river is really the upper continuation of the Monaash—See Goggott River, Chapter III, page 9.

Boicecally River.

222. *Map XII.*—This River left the Jenni (Jenai) River at Mohungunge and flowed to the Joobnee at Dubyah, but was connected with the Jenai by cross channels below Badeyl.

Navigation Map.—This shows the River as navigable from Badeyl down to Dubyah for a part of the year.

No other details are forthcoming regarding the Boicecally River.

Dewangunge River.

223. This river left the Brahmaputra at Dewangunge, and flowing South, joined the Issamuty above Rumatgunge.

Road Routes.—The River was fordable at Golabary.

Navigation Map.—The River was navigable during the rains.

No other information regarding this River is forthcoming.

PART IV.

River between the Issamuty and Joobnee and the Curratty—Foolju River.

Coni River.

224. *Map XII.*—This river flowed out of the Issamuty River at Rumatgunge by two channels to Nulshi—Imaumpour, and thence past Belcuchy to Shazadpour at the junction of the Foolju and Bodussey River.

Navigation Map.—This shows the River as navigable always from Nulshi-Imaumpour down to Shazadpour.

Water Routes.—These show a rains route from Shazadpour past Nulshi-Imaumpour and thence by the Jenni to the Brahmaputra. [It seems clear that the upper part of this route (Jenni River) was the only block which prevented perennial navigation through to the Brahmaputra.]

Road Routes.—There were ferries at Benguchy and Shazadpour. No fords are recorded.

PART V.

Rivers between the Curratty, Foolju, and Bodussey on the East, and the Attrai (Attrai) on the West.

Goor River.

225. *Map XII.*—This river took off from the Attrai (Attrai) River at Budjerapour and, under a succession of names, or in a succession of beds belonging to other rivers, can be traced Southwards right through the Jeel area to a point three miles East of Currunja where the Bodassey River intervened.

This succession of rivers was as follows:—

From Bellua down to Cullum—Goor River.

From Cullum to Chatmol—Baganaddy.

From Chatmal to Nursa—Balaser and Billabakary Creeks.

From Nursa to the Bodussey River—Currunja River.

Navigation Map.—These rivers were all perennially navigable from Budjerapour to the Bodussy River.

Road Routes.—There were ferries at Cullum and Chatmol. No fords are recorded.

Water Routes.—The route formed by the combined rivers is given in detail, but no statement is made as to whether it was perennially or partially navigable. [The inference is that it was so navigable.]

Barally Creek.

226. *Map XII.*—This Creek will be found four miles below Cullum. It flowed out of the Creek between Natore and Cullum and joined the Challun Jeel at Sittalyah.

Navigation Map.—The Creek was perennially navigable through to Nattore.

Water Routes.—This Creek was navigable for a part of the year.

Nagore Creek.

227. *Map XII.*—This Creek joined the Curratty River (from Seebunge) with the Gour River (Taspour).

Navigation Map and Water Routes.—The Creek was only navigable in the rains.

Road Routes.—There were fords at four places over the river. No ferries are recorded.

Nagorcally Creek.

228. *Map XII.*—This Creek took off from the Attri River at Nagorcally, between Chuppalyah and Chatmol, and flowed in the direction of Chatmol, meeting the Baganaddy just above that place.

Navigation Map and Water Routes.—These both show the Creek as only navigable in the rains.

CHAPTER XIV.

Rivers of Maps XIII A and XIII B.

229. For the Ganges and Bhagirathi Rivers see special descriptions (Chapter IV, pages 11 & 23); for the Jellinghi see Rivers of Map XI (Chapter XII, page 61); and for all Rivers north of the Ganges see the descriptions of the Rivers of Map IV (Chapter V, page 32).

The only other Rivers about which information is forthcoming are the Banchli and More; under "Beheaded Rivers"—Dwarka, the beheading of that River by the More is discussed, in Chapter XXI, Page 96.

Banchli River.

230. *Map XIII B.*—This River rises in the hills west of Patchwarry, runs east, and joins the Bogrutty (Bhagirathi) at Jungipur.

Navigation Map.—The River was navigable in the rains only as far up as Patchwarry. This route is not given in the Water Routes.

Road Routes.—There were fords at Patchwarry and Noangong.

More River.

231. *Maps Nos. XIII A and B.*—This river rises in the hills North of Nagore and passing near that place joins the Bogrutty (Bhagirathi) below Moorshedabad. A Creek joins Nagore to the More River.

Navigation Map and Water Routes.—The River was navigable for a part of the year up to its junction with a Creek from Nagore. That Creek was only navigable up to Nagore "sometimes."

Road Routes.—There were fords at several places up to Cullunga (Nagore Creek) and one at Baharow, above that place.

Minor Rivers.

232. *Maps XIII A and B.*—**Road Routes.**—No details regarding these are given, except that most of them are shown as fordable where main roads crossed them.

CHAPTER XV.

The Rivers of Maps XIV A and XIV B.

233. For the Bhagirathi (Bogrutty) and Hooghly Rivers see special descriptions of those rivers (Chapter IV, page 23). For information about Rivers East of the Hooghly from Calcutta Southwards, see descriptions of Rivers of Map X (Chapter XI, page 58).

The remaining Rivers are considered in this Chapter in the following order:—

Adjai (Adjai).

Dammoodah (Damodar).

Rivers between the Adjai, Dammoodah and Hooghly viz : Bonkah, Old Dammoodah, and Sersetty (Sarasati),

Roopnarain.

Cassai (Cosai).

Adjai (Adjai) River.

234. *Map XIV A.*—This River entered Map XIV A from the North-West corner and followed an Easterly course as far as the Bogrutty (Bhagirathi), River, which it joined at Cutwa.

No information is available except for the thirty miles West of Cutwa (Kutwa).

Navigation Map.—For the thirty miles just referred to the River was navigable for a part of the year only, up to Soopour.

Road Routes.—A number of fords are recorded across the river bed, but no ferries.

Road Routes and Map XIII B.—The upper part of the river is shown on Map XIII B; several fords above Soopour are recorded.

Dammoodah (Damodar) River.

235. *Map XIV A.*—This River entered Map XIV A* from the West at Nuddya; and followed a more or less Easterly course till some 10 miles past Burdwan, when it turned due South to the margin of Maps XIV A and XIV B.

Map XIV B.—Thence almost due South to the Hooghly River, which the River joined some four miles above Hooghly Point.

Navigation Map.—By this Map the River is shown as perennially navigable as far up as Burdwan; and above that as navigable for a part of the year for many miles † beyond the Western margin of Map XIV A.

About 15 miles above Burdwan a tributary (Sollee Nulla) entered on the right bank of the Damodar; this tributary is shown as navigable for a part of the year to Soonamooky.

236. **Water Routes.**—These give the route to Ramgur as far as Rany-pookra Gaut (123 miles by river above Burdwan), but no mention is made of how far upwards the river was perennially navigable. The detailed route to Soonamooky is not given. Burdwan stood some two miles from the Damodar River.

Road Routes.—From the confluence with the Hooghly River upwards, ferries are shown at Baugnan and Omtah, with no fords as far up as Omtah—(*Map XIV B*).

* A portion of the Upper reaches of this river as shown on map XIII B.

† As far as Ramgur or some 150 miles, as the crow flies, above Burdwan.

Map XIV A.—Above Omtah fords are recorded at Rajbulhaut, Sirrykistnapor, Burdwan and at some places above Burdwan. [To be on the safe side I have only shown the river as perennially navigable as far up as Omtah, although it must have been so navigable to some unknown point above that place.]

Bonkah River.

237 *Map XIV A.*—This River ran from Burdwan Eastwards to Merzapour on the Hooghly River.

Navigation Map and Water Routes.—The Map shows the River as navigable in the rains only, but the route is not given in the Water Routes.

Old Dammodah (Damodar) River.

238. *Map XIV A.*—This River left the Damodar River at Selimabad and followed a semi-circular course (past Bundipour on the South) to Niaserai on the Hooghly.

Navigation Map and Water Routes.—These both show the River as navigable for a part of the year only.

Diary page 110.—At its junction with the Hooghly, the River was about the same size as the Saraswati (Sersetty) River* but details are not given.

Road Routes.—There was a ford at Jadupaky (near Bandipour).

Sersetty (Sarasati) River.

239. *Map No. XIV A.*—This River left the Hooghly near Satgaon a few miles below the junction of the old Damodar and Hooghly Rivers and after flowing Northwards for a short distance it turned suddenly South, threw out spill channels to Chandernagur, received a channel from the old Damodar near Nursipour; and thence flowing parallel to the Hooghly, entered that River at Sangral (Sankrail) some 8 miles west of Calcutta.

240. *Memoir page 57.*—“Satgong or Satagong, now an inconsiderable village on a small Creek of the Hooghly River, about 4 miles to the North-West of Hooghly, was, in 1566, and probably later, a large trading city, in which the European traders had their factories in Bengal. At that time Satgong River was capable of bearing small vessels, and, I suspect, that its then course, after passing Satgong, was by way of Adampour, Omptah, and Tamlook, and that the River called the old Ganges, † was a part of its course and received that name while the circumstance was fresh in the memory of the people (*Map XIV A and B*). The appearance of the country between Satgong and Tamlook, countenances such an opinion.”

241. *Diary page 110.*—On the 9th May 1764, the Saraswati, near its exit from the Hooghly River, was 7 feet 6 inches deep at High Water neap tides. In breadth it was about the same breadth as the old Damodar, but the breadth is not recorded.

[One is inclined to discuss Rennell's theory of the old course of the Saraswati, as advanced by Rennell, in some detail, but the subject is highly contentious. It is necessary however, to make some remarks upon the theory. Rennell assumed the old course to be as he has mapped it upon *Map XIV A*, as far as Chandila Mah, which was on the North-East corner of Bellya Morass (*Map XIV B*). He then assumed that the Saraswati passed through the site of this Morass to Omptah on the Damodar River. After that it crossed to the Roopnarain River (perhaps) from near Bagnan; thence it followed the Roopnarain bed to Tamlook (Tamluk) and thence to the sea by a route not closely specified. ‡ The river referred to by Rennell as the old Ganges was the Roopnarain in its lower reaches.—*Map No. X A*.

* Banbaria on *Map XIVA* and Banahbaria in the *Diary*.

† [Roopnarain.]

‡ [The original course from Tamluk to the sea is a speculative subject which can only be mentioned here.]

If the student will analyse this route against information available from the routes followed by pilgrims of the very early days, between Bengal and Ceylon, he will find at least some corroboration of Rennell's theory.]

242. Map No. XIV B.—[It is generally believed that the Ganges once flowed past Sangral (Sankrail) and then eastwards to the South side of Calcutta, through the Adi Ganga (Tolly's Nala)—or Surman's Nulla by Rennell—to the sea by a course which I need not describe here. Thus if Rennell's theory is correct there are three main courses of the Ganges (or Hooghly) to be considered :—

- (i) That by Bansbaria, Sankrail and Tolly's Nala.
- (ii) That as suggested by Rennell.
- (iii) The actual course as mapped by Rennell.

There would appear to be no adequate reason (considering such evidence as I have seen) against the three courses above being in true chronological sequence. This matter is referred to again under "Hooghly" under "Beheaded Rivers" (Chapter XXI, page 96).

Roopnarain River.*

243. Map No. XIV A and B.—This river was made up by the waters of Dalkisor and Selai Rivers, which, uniting at Gottaul, made the Roopnarain River.

Road Routes.—The Dalkisor enters Map XIV A near Bissunpour on the West, and no information is available regarding it, except that it was fordable at several points between Bussunpour and Gottaul.

Map XIV A.—The Selai River crosses the Western margin of Map XIV A at Betah, and no information regarding it is available down to Keerpoy, except that there were fords at Mongulpidla and Larigunge.

Navigation Map.—From Keerpoy down to Gottaul the Selai was navigable for a part of the year, but the Water Routes do not include that route.

• **Road Routes.**—There was a ferry at Gottaul and above that point many fords are recorded.

244. Navigation Map and Water Routes.—From Gottaul downwards the River was always navigable by the Navigation Map but the Water Routes do not say that it was always navigable.

Road Routes.—There were ferries at Tamlook, Mauncore and Radg-Gur. No fords are recorded between Omptah and the Hooghly River.

Map No. X A.—The lower reaches of the river were also known as the "Old Ganges."

Cassai (Cosai) River.

245. Map No. XIV B.—This River enters Map XIV B from the West near Midnapour, and it followed a very erratic course, which is best examined on the map.

Road Routes.—Fords are recorded at numerous places, but no ferries.

Navigation Map.—This Map shows the river as navigable for a part of the year from Midnapour to Cawastagry and thence Northwards through a bye-channel to the Selai River. The channel Cawastagry to Mauncore (on the Roopnarain) is also shown as navigable for part of the year. The channel which leaves the main stream some 10 miles East of Midnapour is also shown as partially navigable to Tamlook, but as it does not lead to that place, I have thought it best to ignore the Navigation Map for that route. [It is probable that between Colli and Tamlook a cross country route was possible in the rains.]

Water Routes.—None of the above routes are shown in the Water Routes.

* "Old Ganges" in its lower reaches.

CHAPTER XVI.

Low Lying Areas of Bengal.

246. The low lying areas of Bengal may be considered from two aspects. First those which were low enough to suffer from annual inundation during the period of high water in rivers; and secondly areas which were relatively very low and which remained swampy perennially, or for a considerable time after the flood and rain water, which had inundated larger tracts, had run off.

Part I.—Areas Annually Inundated.

247. **Navigation Map.**—The limits of inundation of Rennell's time are shown in green (enlarged from the Navigation Map) on the Maps which illustrate these notes. These limits must be taken to be approximate only.

Memoir page 268 and 269.—"By the latter end of July all the lower parts of Bengal contiguous to the Ganges and Burrampooter, are overflowed; and form an inundation* of more than 100 miles in width; nothing appearing but villages and trees, excepting very rarely the top of an elevated spot (the artificial mound of some deserted village) appearing like an island." This inundation Rennell assigned to two causes. First, to the excess rain water collecting in comparatively low areas; and secondly, to actual inundation from the Rivers; the latter being the later or second phase, without which the complete process of inundation was not consummated. That portion of the inundation due directly to the Rivers did not occur until the Rivers topped their banks,† which as a rule they did not do by more than about a foot. Thus the area inundated was deeper further from the River than near to it, the River banks generally being higher than the country inundated. The River inundation was merely a second invasion by water of areas already partially covered by semi-stagnant water. But even when a River overtopped its banks, its course could generally be followed by inspection. The River stream would be rapid and muddy but the inundated area would be covered with water of a "blackish hue," *** "nor does it ever lose this tinge, which is a proof of the predominacy of the rain water over that of the river.—*Memoir page 270.*

248. *Memoir page 260.*—Although a river in flood might flow at 5 or 6 miles an hour along a bed with a smaller declivity than that of the land inundated, the rate of progress of the inundation was generally only half a mile an hour.

249. It will be well to examine the limits of inundation shown on the maps which illustrate these notes:—

250. *Maps VIA, VI B and V.*—[These show little but Brahmaputra inundation and cover comparatively narrow areas, the apparent reasons for which need no comment.]

251. *Map XII.*—The inundation was partly due to the Brahmaputra, the Ganges, and Rivers flowing from the North. No definite limits are assigned to the activities of these agents separately. [The uninundated area around Surda seems doubtfully correct. The Map shows an area of "very low lands" on the North and it is hard to see how they avoided inundation.]

252. *Map IX.*—No inundation details are available for the areas covered by this map.

*I have not considered tidal inundation. Rennell has left no information regarding it, except that the figures he gives do not refer to areas within tidal limits.

† [Rennell either overlooked or considered too obvious for mention, that part of an inundation due to rivers backing up their own tributaries before a main river topped its banks] although he mentions that the Ganges backed up the waters of the two branches of the Tista which flowed into it.

253. *Maps XA and XB Map XI.*—These areas are wholly tidal, and Rennell does not show them as inundated.* The inundation limits are taken to the South edge of the map. Rennell gives no definite limit, southwards, for the inundation. [But that it proceeded further south is obvious as these areas were fully tidal]. The tidal line shown on Map XI is very speculative on the Eastern side of the Map.

It will be observed that the inundation limits on the West, stop short far East of the Hooghly River and its upper feeders [but it is clear that before Rennell's time when the whole inundation was from the Padma or Lower Ganges, a portion at least of the uninundated part was subject to inundations]. The Memoir page 270 states that Dykes kept off inundation and that the Bhagirathi was embanked for 70 miles. In all it was computed that there were more than 1,000 miles of such embankments in Bengal and when the Bhagirathi was high "passengers in boats look down on the adjacent country, as from an eminence."

254. The only other similar embankments mentioned (for Map XI only) by Rennell are minor works along the Ganges South bank for a few miles at a time (See Embankments, Chapter XIX, page 93).

[How far the uninundated area of Map XI was due to embankments on the Bhagirathi and to embankments not mentioned specifically by Rennell, or to lack of original inundation cut off by the Ganges adopting the Padma as its main channel, are subjects worthy of further consideration, the uninundated area being now notorious for its insalubrious climate. So far although suggested† the connection between these two features is not admitted to have been established.]

256. *Maps XIII and XIV A.*—Rennell shows no inundation limits, but it is clear that before the embankments referred to above (Map XI) were constructed, River inundation probably covered certain areas on these maps.

257. *Maps XIV B, XA and XB.*—Rennell shows no inundation limits on these maps. The greater part of the areas were tidal and as stated already Rennell has left no details regarding tidal inundation.

258. *Map IV.*—It is not quite clear which Rivers contributed to the inundated areas on this Map [but the main contributors must have been the Kosi, Ganges and Lower Mahananda Rivers, and at least a part of the Ganges spill must have been disseminated up its own feeders; otherwise the uninundated strip on the north of the Ganges could not have occurred.]

259. *Map VII A.*—The limits of inundation on the North are probably only very approximate. Change may be expected in these limits fairly soon so far as they were established by the Brahmaputra River, which now occupies another course far to the West of the main course in Rennell's time. It is possible that this change in course by reduction of inundation limits in the Mymensingh District, may induce unhealthiness in the climate locally.]

260. *Map VII B.*—The inundated area is partly due to inundation by the Brahmaputra and partly by the Silhet Rivers. [No comment is needed, as until this area is raised its inundation limits are not likely to change appreciably.]

261. *Maps VIII A and VIII B.*—A part of the inundated area is tidal, but the tidal limits shown on these maps are speculative except at a few points.

The inundation between Luckipour and Colinda (Water Routes) was only deep enough to permit of "Pulwars" [very small boats] passing across it.

262. *Memoir page 272.*—From about the end of July till some days before mid-August, the depth of inundation gradually increased, but then reached its maximum. After standing practically steady for a few days, the River would begin to fall at the following rates:—

Latter half of August—3 to 4 inches per diem.

September—3 to 4 inches per diem.

October and November—Gradually from 3 to 1½ inches per diem.

December to the end of April—Half an inch per diem.

* Rennell's annual inundation limits are not shown to the South of Map XI, where the southern limit of inundation is left indeterminate.

† See my Report on the Nadia Rivers, 1917.

In 1774 the Ganges remained up for a month longer than usual, but ordinarily the inundation figures quoted above would hold "with as much regularity as the vicissitudes of the seasons."

The fall in the inundation levels would not keep pace with the fall in River levels, "by reason of the height of the [River] banks; but after the beginning of October, when the rain has nearly ceased, the remainder of the inundation goes off quickly by evaporation."

263. Naturally the depth of inundation of a special tract would vary with the levels of its surface. Rennell has left the following figures regarding inundation depths, etc. :—

Diary page 153 and Map VIA and B.—The general depth of maximum inundation near Chilmari was $1\frac{1}{2}$ to 2 feet 3 inches.

Diary page 176 and Map VIIB.—The country near Ammargunge was generally over-flowed for 5 months in the year.

Diary page 147 and Map VIIA.—The Brahmaputra topped its bank near Bygonbary on 14th July 1765.

There are other such references in Rennell's papers but being of no apparent value, I have omitted them. The deepest inundation mentioned is twelve feet.

PART II.

Very Low-lying Areas.

264. An examination of each Map in turn will show lakes and swamps coloured in burnt seinna. [It is beyond the scope of these notes to draw special attention to any but the main low-lying areas in Bengal, but there are a number of main areas of swamp or jheel which need to be specially noted upon. For convenience of expression I shall call these areas, depressions, although at present the question of whether the areas originated by local depression, or are merely portions of Bengal omitted from the building operations of rivers or are deserted river beds is not one upon which there is no agreement. It is even possible that some depressions are of one type and others of another.]

Sylhet Depressions.

265. *Maps VIIA and VIIB.*—The limits of this depression have been transferred from Rennell's 5 miles Maps. But these Maps show no clear limits to the depression, and I have been guided by the limits of the swamp symbol adopted by Rennell on the 5 miles Map of Sylhet. [In printing the Maps used in this report, those symbols did not always reproduce.]

Map VII B shows the Dugdugga Creek as running towards the depression [although the general lie of the country seems against the direction of its course. A large number of other rivers seem to have been attracted towards this area. But none of these items are any proof of more than relative depressions]. The depression lies more or less parallel to the North and South axis of the elevated tract to the West.

Chalan Bhil Depression.

266. *Maps XII and VIIIA.*—This depression commences with what Rennell calls the Challun Jheel, East of Nattore, and continues down to Tillee on the Dollesary (Dhaleswari) River. Thence low ground South of that River continued most of the way to Dacca. But it is only between Nattore and Tillee that Rennell has recorded the limits of the low country, and those limits, as shown by me on Map XII should be ignored for special investigation purposes, Map XII was drawn in 1772 from surveys made between 1769 and 1771. Rennell afterwards revised the mapping (*Atlas Plate No. 56*) of the low-land area, and *Atlas Plate No. 56 should be used for special investigation.* That Plate was drawn on the scale of 4 miles to 1 inch in 1775.

267. [I have referred to special investigation for several reasons, only one of which I need specify here. It has been said that the perennial water limits of the Chalan Bhil have become curtailed in recent times.

Atlas Plate No. 56 shows clearly as a result of a "correction survey" both the limits of perennially "*swamp*" area and those of perennial *water* in 1775. These latter limits are shown for the following "jeels":—

Challun, Billabokary, and Gazenan (south of main line of depression). But the perennial swamp limits terminate at Baljuree and are not carried Eastwards to Tillee (as upon Map XII).

So far as the Chalan Bil is concerned, therefore, Rennell has left information of considerable value.

This depression lies between elevated land on each side of it, but it is parallel to the main axis of neither.

Rennell considered that the depression might have represented a former channel of the Ganges. (Memoir Page 265):—"appearances favour very strongly the opinion that the Ganges had its former bed in the lakes between Nattore and Jaffiergunge leaving its present course at Bauleah (Rampur Boallia) and passing Pootya; with an equal degree of probability (savoured by tradition) we may trace its supposed course to Dacca—."

[One is inclined to think that if Rennell had examined the nomenclature of rivers, on his own maps, he might have held the opinion expressed above less strongly. Perhaps the most interesting River in this area and North of it, is the Teesta and Attrai (Attrai). In Chapter IV I have traced the course of this River from above Jalpaiguri to the Ganges, and it is obvious that it is a younger River than the Curratty (Karatoya) which it has beheaded. If the Ganges once flowed past Sarda and Nattore into the Chalan depression, obviously it must have done so before the Attrai established its course as traced by me on Rennell's Maps. The Attrai course never enters the depressed area at all, but skirts its western edge. It is difficult to see why it should have done that with the depressed area so handy for its waters; the impression is that the Attrai established its course before the depression was established. The Goor River obviously is a later product than the Attrai. It took off the Attrai's water from near Budjerapour (Map XII) and so killed the lower Attrai; the Goor River took that water straight into the depression.

Further, a reference to the Western side of Map XII shows four rivers with parallel West to East courses:—

- (i) The Attrai which turns (from a North and South course) at right angles, at Dulabary.
- (ii) The Barruly which turns similarly at Nohutta, but which in Rennell's time still maintained two streams flowing into the Ganges West of Rampour Bauleah, which streams are in continuation of its apparently original North and South course.
- (iii) (iv) The Narrud and Burreyl River which flow parallel to numbers (i) and (ii) above.

Why should the first two rivers suddenly change their courses at right angles? And why should all these four Rivers run more or less parallel for some time, and all head ultimately for the depressed area?

The inference is that all four rivers were "attracted" towards the depression; and if that depression was merely an old bed of a great river, it could not have had the attractive power that these four rivers seem to assign to it. Again there is no single name* on Rennell's maps, between Surdah and Jaffiergunge by way of the depression—which suggests, in the remotest way, that the main Ganges once flowed by that route. Lastly there is elevated land of a peculiar type on each side of the depression; if that land is of recent elevation, its elevation would tend to cause compensatory depression in mid-Bengal. Much more might be written on this interesting subject, but I have merely mentioned the salient points that have occurred to me whilst examining Rennell's maps for evidence regarding this depression].

*[Nor apparently is there any traditional evidence to that effect.]

Comergong Depression.

268. *Map XII.*—This depression lies along-side and parallel to the elevated area North-West of Rampour Bauleah. It is occupied by the upper reaches of the Baruly River [and its appearance suggests that at one time it may have been a part of the bed of some River of greater importance than the Baruly. The depression seems to lie too close to the elevated area to be compensatory to it].

Khulna, Faridpur and Backerganj Depression.

269. *Map XI.*—This depression is the largest recorded by Rennell. It extended for some 80 miles from side to side, and seems to have been connected with the Ganges, by a series of lakes or "Jhils" which run South-Eastwards, in a direct line from Custee on the Ganges, to the main depression.

I have traced the course of the Comer River from one side of Map XI to the other and the only break in its course [is where it has been beheaded by the Chandna River West of Motropour. The inference is that the Chandna River, and perhaps the Gorroy River, are newer streams than the Comer, or, at least were once of less importance than that river, for both lost their names as soon as contact with the Comer was established.

The situation of the area where the Comer has been beheaded lies more or less in the line of the jhils between Custee and the main depression, and now the Comer in its beheaded reaches, runs in the direction of that south-east line, whereas originally it must have run in the contrary direction. There is at least a suggestion therefore that the South-East line of Jheels is the result of actual depression].

It will be observed that the Comer, as shown by Rennell, skirts the North of the main depression in its Eastern reaches, and that the [newer] Rivers, Nobogonga,* Gorroy and Chandna are distracted from the original line of drainage (as indicated by the course of the Comer River) towards the main depression between Khulna (Calna) and the Ganges. But West of that place the Boyrub and Cobbaduck Rivers both flowed between low lying areas and not into them.

[The suggestion is that the two blocks of jhil area west of Khulna are separate from the Eastern block, and may perhaps represent areas which were omitted in the land raising programme of rivers of the past. Whilst the Eastern block may be the result of local depression, or may perhaps be a combination of "omitted" area with local depression.]

The evidence available from Rennell's Map XI is not clear, but possibly, if it is considered with other evidence that may be available, it may be of some value.

Salt Lakes Depression.

270. *Map XIVB and Map XA.*—The map shows a number of depressions on each side of Rennell's Hooghly River, around Calcutta. [All of these seem to be associated with old courses of the original Ganges.]

[The Adi Ganga flowed through what Rennell calls "Surman's" (Tollys Nala) and between the Salt Lakes and the depression South-West of it.]

The Sarasati,† (Sersetty by Rennell), is supposed by Rennell to have passed near or through the depression west of Calcutta to Omptah and thence past Tamluk on the Roopnarain River.

The Salt Lakes were salt in Rennell's time, and I believe are unique in Bengal in that no other salt‡ inland lowlying area so far inside the delta is recorded. The depths (at low water) of the navigation channel through the Salt Lakes is given on Map XA in feet at lowest water. At Baliogot the depth

* Newer at least by the meaning of its name.

† See description of that River (Chapter IV).

‡ [The occurrence of fresh water lakes and jhils well within the tidal areas is one worthy of careful study.]

is given as 3 feet at the head of the channel which was cut after that map was made, from the Hooghly, partly by Tolly's Nala, to the Lakes. The other depths recorded varied between $3\frac{1}{2}$ and $5\frac{1}{2}$ feet.

The other depressions near Calcutta may perhaps be areas omitted from land building operations by the old Ganges. [The only information to be obtained from Rennell's maps seems to be that there may be some inter-relation between the three sets of depressions, which occur on the South, East and West of Calcutta.]

Midnapur Depressions.

271. *Map XIVB.*—The information regarding these left by Rennell is very scanty, and can be of little use. I have merely marked on Map XIVB the two places in which Rennell has used the symbol for low ground. It is clear from that map that Rennell's staff did little work in the hinterland of the Midnapore area.

Malda Jeels.

272. *Map V.*—East of Maulda, inside the high land coloured yellow on the map, there occur two "jeels" which are peculiarly situated.

They occur on or near the courses of the Tangan and Purnabubah Rivers, which cut through the high land.

[The question arises as to whether these rivers have cut their way through the high land—which is very stiff material in its upper strata—or have managed to maintain their beds during an uneven up-heaval of the high land.] Rennell gives the limits of these "jeels" and apparently they were carefully surveyed.

[An examination of the area, now, or at some future date, may show that the low lying areas have been curtailed, since Rennell's time. If so the high land is probably rising still.

But if the depressed area has increased, the inference may be that the high land is sinking.]

Moorshedabad Depression.

273. This depression lies to the West of the Town of Murshidabad. It is intersected by the Dwarka River [which has been beheaded by the More River] the latter flowing between the two main blocks of the depression in Rennell's time. (See Chapter XXI, page 96.)

CHAPTER XVII.

High Lands in Bengal.

274. Rennell's maps show the Province as bounded by the Himalaya on the North; the Tippera and Chittagong Hills on the East, and the Rajmahal Hills—in places—on the West. They also show the Garo and Khasi Hills abutting from the East. In none of these cases can the information left by Rennell be of much value. His maps show no contours and in no case did he visit, and survey, inside the main limits of the ranges mentioned above.

Similarly where routes are shown through the hills it may be taken that their direction is general rather than actual.

The rough heights of the Garo and Khasi Hills are recorded (Maps VIIA and VIIB), and it is stated that a high mountain of the Himalaya was visible from 135 miles away (Map VIA). Information of this type can be of little practical value, and such information as Rennell has left regarding the outliers of the main ranges, similarly, can generally be neglected.

But besides the above, Rennell shows certain elevated tracts [elevated in the sense that they lay well above the general level of the plain] *Map XII*.—The first lies between the Ganges and Dinajpur, and the second North of Dacca. A third (but much smaller) lies just west of Comilla. *Map VIIIA*.—With regard to the two former, Rennell states that there was strong presumptive evidence (*Memoir page 268*) of the wandering of the Ganges from one side of the Delta to the other, because "between Tippera on the East and Burdwan on the West; and between Dacca and Bauleah on the North, no virgin soil existed anywhere. Out of the vicinity of the great rivers, the soil was either red, yellow, or of a deep brown.

Thus Rennell discriminated clearly between the composition and formation of the higher lying tracts under the discussion, and that of the rest of the plain; but he gives no geological explanation of those higher tracts.

275. On Map XII, for convenience of reference, I have shown the full limits of these two main tracts.

276. With regard to the Maulda tract, it will be observed that Rennell shows the actual limits, by a definite symbol, of the parcels of high land which make up the whole. Those limits can be taken as approximately correct. The Maulda block is intersected by two rivers (Tangan and Puranbubah) each of which is associated with a swamp. [Whether or not these rivers had cut their way through the high land, or had existed before it rose and so had maintained their beds is not ascertainable from Rennell's records. But the fact that the Chalan and associated "Jeels" lay between the two blocks of high land, suggests recent elevation (see description of low lands, Map XI, Chapter XVI).]

The limits as shown by Rennell have some present day or future value, in the ascertainment of whether this tract is stationary, rising, or being depressed.

On the East side of the Maulda tract is a succession of "Jeels", which lie parallel to the run of the high land and close to it. [If the tract is of recent elevation these "jeels" are difficult to explain, unless they represent the bed of a former river of large proportions.]

No depression appears in Rennell's map West of Malda.

277. The Dacca tract of high land is best examined in sections as shown on Maps XII (North-West sections), Map VIIA and Map VIIIA. In none of these cases . . . are the exact limits of the high tract shown by Rennell. The limits on Map XII (North-West section only) may be intended to have been fixed by survey [but I am doubtful upon that point.] And obviously the interior was not surveyed; beyond the fact that it contained "Hills, Woods and Morasses intermixed" there is little to be learned from the Map XII as originally drawn by Rennell.

The information on Map VIIIA is also unsatisfactory. The Eastern limits, [as shown by me are merely guess-work.] In the North-East corner, however, a certain amount of survey work is shown, two Creeks (which fall well inside the high land as is indicated by the hill symbols on the map) flowing from the Banar River on the North, into that river on the East.*

278. The Southern part of this area is shown in some detail on Map VIIIA. The main outside limits, where shown without a broken symbol are taken from Atlas Plate No. 58. which is on the scale of 2 miles to 1 inch, and, *which, for a study of this area, should be followed, in preference to Map VIIIA*, which is too generalized to be of real value. The area was intersected by rivers and it is obvious that except North and North-West of Dacca, the surface was very uneven.

On Map VIIA, I have shown various outliers to the main block of high land. It will be observed that these spread as far East of Dacca as the Little Burrampootry River. These additions to Map VIIIA are taken from several other sources (by Rennell) which I need not specify in detail here.

This Dacca-Mymensingh block of high land had a depression on each side of it (Map VIIA, VIIB and XII).

279. On the South-East of this block of high land, near Comilla, will be found (Map VIIIA) a small elongated area coloured yellow, now known as the Mainamatti Hills. In Rennell's time the Goomty River at its northern end, was navigable perennially up to Mirzapur village (see description of Goomty River, Chapter VIII, page 43). [It appears from Map VIIA that this river has been deflected to the North-West, by the obstruction of this small patch of raised land. And it may be surmised that if this area is now being elevated, the river bed near Mirzapur may become still further obstructed, or may be still more deflected to the North.]

In addition to the areas described above I have used the symbol for high land to illustrate various other items which will be noticed in the different maps; amongst these may be mentioned:—Sanddunes, obstructions in River beds; fortifications, etc. It seemed unnecessary to introduce extra symbols to indicate such items.

* These Creeks are referred to in Chapter XXI, page 96.

CHAPTER XVIII.

Tidal Information.

280. From such meagre information as Rennell has left regarding the inland upper limits of invasion by tides, I have shown on Maps XI, VIIIA, and VIII B, by a purple line, *a very rough approximation of the upper limits of tidal action*. The line is merely guess work in places, and probably its most useful purpose will be to save the reader some trouble in identifying the places referred to below. [My first intention was to omit any reference to tidal data, but although what I record here may be of little use to-day, a time may come when it may have value].

281. The information given below has been extracted from Rennell's Diary and the Water Routes. These latter need some explanation.

In the explanation on page 9 of the Water Routes Rennell uses these words:—"When the passage lies through a Tideway the word Tide is inserted in the margin." In many cases Rennell followed this rule, but a study of the Water Routes with other information left by Rennell, shows clearly that the word Tide, when used in the Water Routes, means a reach sufficiently tidal to affect navigation. [And naturally there is a great difference between the upper tidal limit in such a case and that which would be obtained by close observation. Thus the value of the Water Routes is greatly reduced; and beyond inferential use they afford little help].

281. *Map XI*.—In this examination let us begin at Nuddea (Nadia) on the Bhagirathi and work eastwards:—

282. **Hooghly River**.—The bore was perceptible above Hooghly Town (Memoir page 278).

The "End of Tides" is placed at Culna (Water Routes) and therefore was perceptible above that place.

Rennell does not mention tides near Krishnagar when calculating the amount that the River would rise before its channel was full (Jellinghy River). [Presumably therefore Krishnagar was non-tidal.]

[In view of the above evidence I have placed the upper limit of tidal action near Nadia.]

283. **Issamot River**.—At Bongong, on 11th February, 1767, the tidal rise was about 18 inches (Diary page 188).

284. **Cobbaduck River**.—The tide flowed up above Jingergutcha (Diary page 189).

285. **Boyrub River**.—Nulgunge (just above Moorley) was non-tidal (Diary page 189).

286. **Sittareeah River (Southern Branch)**.—There was no tide at Daccullee (Diary page 190).

287. **Sittareeah River (Northern Branch)**.—The tide flowed above Gunagotty, and was appreciable $1\frac{1}{2}$ miles East of that place, where the Calcutta-Hadgigunge Road crossed a creek. (Diary page 190.)

288. **Nobogonga River**.—There was a tidal rise of nearly $4\frac{1}{2}$ feet at Pidtya on 22nd February, 1767. (Diary page 190.)

[The rest of the purple line on Map XI is absolutely unreliable; no information indicative of the upper tidal limits of the Burrasaat, Burrashee, Comer or Ganges Rivers being forthcoming].

289. *Map VIII A*.—**Issamutty River**.—"The tides are scarce felt 3 Reaches above Toolsey" (near Churan) *. (Diary page 180).

*Toolsey Creek. The tides came from the East.

290.—**Tagerpour Creek.**—(Between Toolsey Creek and Dacca). The tides entered this Creek from the Dhaleswari River (Diary page 180).

291. **Dhaleswari River.**—This River was tidal (from the Megna) anyhow as far up as Curruah, as Curruah Creek was tidal (from the Dhaleswari) (Diary page 180).

292. **Little Burrampootry.**—The highest point at which tides were felt was Pikerchoar village, where the rise was 8 or 9 inches between 23rd May and 2nd June, 1765. Above Pikerchoar the tides were imperceptible (Diary page 145).

293. **Megna River.**—About May 22nd, 1765, the tides were “almost imperceptible” above Nursingdy village (Diary page 145).

No information is forthcoming regarding the remainder of the tidal line on Map VIII A; [and the rest of the line adopted by me is purely speculative].

294. *Map VIII B.*—**Daddana Creek.**—On this Creek lay Colinda. The Creek was navigable at half tide to Colinda (Diary page 175).

295. **Little Fenny River.**—The tide flowed regularly all the year, [and the river must have been tidal well above Cossideah since the Daddana Creek was tidal]. (Diary page 175).

296. **Fenny River.**—[Obviously this River was tidal for some distance above its mouth, but Rennell has left no information].

297. East and South of the Fenny River no information is available.

Tidal Bores.

298. Bores prevailed in the principal branches of the Ganges and Meghna Rivers, but the Hooghly River, and the passages caused by the confluence of the Ganges and Meghna, Rivers were more subject to bores than the intermediate River mouths.

299. • **Maps XIV B and XIV A.**—In the Hooghly River, the bore commenced near Hooghly Point (Map XIV B), where the River first contracted, and in 4 hours it would pass up to Hooghly Town (Map XIV A) a distance of 70 miles. The exact upper limit of the bore is not recorded but it was “above Hooghly Town.” At Calcutta “it sometimes occasions an instantaneous rise of five feet.” (Memoir page 278).

300. *Maps VIII A and VIII B.*—“In the channels between the islands in the mouth of the Megna, etc., the height of the bore is said to exceed twelve feet; and is so terrific in its appearance, and dangerous in its consequences, that no boat will venture to pass at spring tide. After the tide is fairly past the islands, vestige of a bore is seen, which may be owing to the great width of the Megna in comparison with the passages between the islands; but the effect of it is visible enough by the sudden rising of the tides.”

Miscellaneous Information.

301. During the swollen state of a river the tide lost its power of counter-acting the stream, and in a great measure that of ebbing and flowing, except very near the sea (Memoir page 270).

From where the tide commences * to the sea the height of river periodical increase diminished gradually until it totally disappeared at the point of confluence (Memoir Page 273).

302. The numerous “canals”† of the Sunderbans “are so disposed as to form a complete inland navigation throughout and across the lower part of the delta, without either the delay of going round the head of it‡, or the hazard of putting to sea.” The navigation through the woods, or Sunderbans, is effected chiefly by means of the tides” (Memoir pages 259 and 282).

* [That is from the furthest point reached inland.]

† The deltaic rivers and cross-rivers are intended.]

‡ [That is without going far inland.]

303. *Diary page 150.*—A set of Rennell's tidal observations at Dacca are given below:—

Tides at Dacca "on Ye Poeshtah."*

					Feet.	Inches.
22nd April 1865	..	..	..	..	14	3
7th June 1865..	..	..	..	..	11	7½
22nd June 1865	..	..	..	..	10	6½
27th June 1865	..	..	..	..	9	11
7th July 1865	..	..	..	..	7	4
9th July 1865	..	..	..	..	7	5
19th July 1865	..	..	..	..	5	2½
2nd August 1865	..	..	..	..	1	10½
3rd August (morning) 1865	..	..	..	..	1	7
4th August (morning) 1865	..	..	..	..	1	2½
5th August (morning) 1865	..	..	..	..	0	10½
7th August (morning) 1865	..	..	..	..	0	7
8th August (Low tide) 1865	..	..	..	..	0	9½
9th at 11 A.M. ½ flood 1865	..	..	..	..	0	12½
10th August ..	..	..	..	..	..	..
11th August at ½ past 9½ flood	..	..	..	..	0	9½
12th August ..	..	..	..	..	..	..
13th August at 9 morning	..	..	..	..	0	8½
13th August at 6 evening	..	..	..	..	0	8½
14th August at 6 evening	..	..	..	..	0	9
15th August ..	..	..	..	..	..	..
16th August morning (High water)	..	..	..	..	0	9½
17th August 10 A.M.	..	..	..	..	0	10½
19th August 10 A.M.	..	..	..	..	0	10½
20th August ..	..	..	..	..	..	..
21st August High water	..	..	..	..	0	13'
23rd August ..	..	..	..	..	0	12½
25th August ..	..	..	..	..	0	15½
29th August ..	..	..	..	..	0	20
3rd September	..	..	..	..	0	26½
4th September	..	..	..	..	0	29½
7th September	..	..	..	..	0	26
10th September 1865	..	..	..	..	3	7

* See Atlas Plate No. 58 on which the word "Poostahgola" occurs. [This apparently was Rennell's guage.] The first observation given was 22nd April 1765 at new moon, high water. The meteorological conditions at the times of some of the observations are recorded in detail, in LaTouche's Diary. [I do not think that the observations were all taken by Rennell, as apparently he was not in Dacca on all the days for which observations are recorded.]

CHAPTER XIX.

Embankments.

304. In the Memoir page 2 we find:—

“There are particular tracts of lands, which, from the nature of their culture, and species of productions, require less moisture than others; and yet, by the lowness of their situation would remain too long inundated were they not guarded by dikes or dams, from so copious an inundation as would otherwise happen from the great elevation of the surface of the river above them. These dykes are kept up at enormous expense; and yet do not always succeed, for want of tenacity of the soil of which they are composed. It is calculated that the lengths of these dikes collectively, amounts to more than 1,000 English miles. Some of them at the base, are equal to the thickness of an ordinary rampart. One particular branch of the Ganges (navigable only during the rainy season, but then equal to the Thames at Chelsea) is conducted between two of these dikes, for about 70 miles; and when full, the passengers in the boats, look down on the adjacent country, as from an eminence.”

305. **Bhagirathi Embankment.**—The river referred to as being embanked for about 70 miles was the Bhagirathi, but Rennell's maps do not show the reaches of the river so enclosed.

306. It is unfortunate [in view of recent discussion upon the engineering advantages, and sanitary disadvantages, of embankments] that Rennell has left so little information regarding their distribution in his time.

307. **Minor Embankments.**—Apart from embankments for purposes of local fortification or protection (and with one exception I ignore these in these notes since they were usually small in compass, and generally on high ground) Rennell only refers to inundation protective banks here and there—those of the Bhagirathi have been mentioned already; a few others are given in my description of the Ganges River in (Chapter IV), and in one place the road from Calcutta towards Hadgigunj was embanked for $3\frac{1}{2}$ miles (Map XI near Jawberia—Diary page 187).

These, with the Bhagirathi embankments, cannot account even for 200 miles of dykes, so there remain about 800 miles to find, in Rennell's time.

308. **Burdwan Embankments.**—La Touche refers to a letter * of Mr. Verelst, dated April 14th, 1766, directing Plaisted (who died in 1767) as “the Surveyor of the Burdwan Province to procure and transmit to him a particular account of the “Bunds,” † and further to join Mr. DeGloss who is upon the same service at the Bunds of Mandergatchee and Balrampore.”

[If the reports of these officers could be found they may throw much light upon the distribution of embankments a century and a half ago].

308(a) **Rangpur Embankments.**—The exception already referred to in paragraph 307 was the old rampart south of Rangpur (Map VIA), which extended for some 15 miles from West to East.

309. **Sunderbans Embankments.**—[Apparently none of the cultivation embankments which now exist South of the line of forest shown on Maps XIV-B, and XI, existed in Rennell's time]. In the Memoir (page 259) Rennell states:—“This tract known by the name of the **Woods** or Sunderbans, is in extent equal to the Principality of Wales and is so enveloped in woods, and infested with tygers, that if any attempts have ever been made to clear it (as is reported) they have hitherto miscarried.”

* Diary page 186.

† Embankments.

CHAPTER XX.

Road Communications.

310. The Maps illustrating these notes show in red all the roads shown on the original Maps, and one or two included from other sources by Rennell.

Inspection of the Maps will give the idea that in Rennell's time Bengal was well provided with roads. A further inspection will show that sometimes a road passes through a swamp, and one becomes suspicious that there may be "roads *and* roads."

311. A very important road was that from Calcutta to Hadgigunge (Map XI). It is described on pages 195 and 196 of the Diary. In that description the terms "good roads" and "very good road" occur, but such remarks as these also appear:—"Road across paddy fields;" "rough road;" "jeels in the road;" "bad road;" "mostly a crooked road;" "low swampy plain;" "swampy country," etc. On page 186 of the Diary, referring to the same road, Rennell remarks that the road was seldom good, and being excessive narrow, rough and crooked and very frequently running across Paddy Fields, and "that when the ground is ploughed up there are no traces of a road to be found."

312. The roads in Noakhali District (*Map VIIIB*) seem to have been worse than that described above. In June 1766, in the neighbourhood of Colinda, the roads were very bad and apparently under a foot of water. The road from Lukhipour to Colinda was in general "broken." (*Diary page 175*).

313. With regard to the main road to Chittagong (Map IX) Rennell wrote (*Diary page 176*):—"The roads between the Fenny and Islamabad* are intersected by a great number of nullas, etc.; as most of these want Bridges, the roads are almost impassable during the rainy season."

314. In the Diary page 159, it is stated that the roads in Goalpara, between Bijnee and Rangamatty, were "scarcely broad enough for a Palankeen to pass" and the country was everywhere intersected by "Creeks and frightful Gullies over-grown with jungles."

315. The above remarks show that the routes indicated on Rennell's maps were merely tracks, which in the rains were probably often totally impassable except in boats. Thus we find in the Road Routes (page *iv* of the Preface) that "few rivers or nullas that exist in the dry season, can be fordable during the rainy season or for some months afterwards" Yet most of the roads shown in Rennell's maps will be found in the Road Routes and it is seldom (except on the most important routes) that "fords" are not shown in the course of a route.

316. Nor did Rennell or his Assistants trace out every road recorded by them, as some of the roads (Road Routes page 3) were taken from sketches and journals of travellers.

317. Bridges appear to have been few and far between. There was one about two and a half miles North-East of Dum Dum on the road to Barraset (*Diary page 186*). A few on the Fenny-Chittagong Road (*Diary page 176*); and three at or near Dacca viz:—one in the middle of Dacca Town; one North of the town some 10 miles; and one at Meergunge (West of Feringhy Bazar). These three bridges are shown on Atlas Plate No. 58.

Doubtless other bridges occurred, but they must have been unusual occurrences.

318. Excluding roads which run along natural features, such as the road along the sand dunes in Midnapur (*Map XIVB*) only one case of an embanked road is mentioned. That road was between Jawberria* and Hottymbur† (*Map XI*), a distance of about $3\frac{1}{2}$ miles : there the road was “ raised above the level of the country ” [but it is open to question whether the road had been intentionally embanked, or whether it merely followed a protective embankment]. :

319. It may be taken, therefore, that in spite of the array of the roads shown on Rennell's maps, practically none existed worthy of the name. But a careful examination of the Maps of any locality which one knows well, shows that the present day road system follows, very frequently, the alignments of roads or tracks of Rennell's time.

* About 11 miles north of Barrasett, on the road between that place and Mullicpour.

† Not marked on the map.

CHAPTER XXI.

Beheaded Rivers.

320. By a beheaded river I mean an old river which has been cut in two by a younger river. This beheading may occur in several ways, and broadly speaking I include under this head any movement by a younger or minor river which in any way has tended to destroy or impair the vitality of an older river.

How far it is correct to compare the relative ages of rivers in the way suggested above is not a subject regarding which everybody will agree. The fact is the subject has not been sufficiently enquired into.

Rennell's maps suggest many cases of beheading, the more important of which are catalogued below. [In considering these cases, it may be remarked that I do not say that every case quoted by me is necessarily established, but rather that Rennell's maps give sufficient evidence to suggest further examination].

Bhagirathi River.

321. In the description of this river in Chapter IV, page 11, it has been explained that the name Bhagirathi exists in Map IV, and in Map XIII B. The river, however, has no course between the two banks of the Ganges. The Bhagirathi is said once to have been the main Ganges at Gaur.

Thus it appears either that the Ganges as shown by Rennell, has cut the Bhagirathi in two, or has relegated the lower section of the Bhagirathi (Map IV) to an inferior position, by sending water down an originally minor channel, now occupied perhaps by the Padda.

Rennell's work throws light upon the probable reasons why the Ganges deserted its old main bed near Gaur (Map IV).

From that map the inference is that at one time the main Kosi entered the Ganges opposite Rajemal, after passing near Purnea. Later the river changed its course to a point near Cuttry, and then flowed Eastwards past Caragolah and Maniahry to Rajemal. Later this channel was deserted and the confluence was established at Cuttry; and that establishment may reasonably be ascribed to the main Ganges cutting Northwards towards Cuttry. We may suppose, to simplify explanation, that whilst these changes in the Kosi were taking place, the main Ganges flowed past Gaur. In that case the Ganges could hardly have occupied its main Siclygully-Rajemal bed, as shown by Rennell. It seems more probable that it occupied the northern bed past Echarpour, and that Rennell erroneously ascribed that bed to the old Kosi. The real entrance of the Kosi to the Ganges was perhaps then at Comillapour and not opposite Rajemal.

Credence is lent to this theory by the existence of a large arm of the Ganges (shown by Rennell) from opposite Siclygully to Causillapour, and by that arm admitting of the main Ganges passing down the Bhagirathi from SUNDH.

If the Ganges deserted this Northern channel and adopted the Siclygully-Rajemal main channel of Rennell, the Bhagirathi would become decadent, and the old Northern bed of the Ganges might thus easily have been considered by Rennell as an old Kosi bed.

Curratya (Karatoya) River.

322. The descriptions of this River (Section I) and of the Curto River should be read carefully. It will be noticed that Rennell spells the name of the Karatoya River in a number of different ways:—Corto, Coretya, Curratoya, Curratya and Curtya. I have taken all these to represent the original

Karatoya for reasons given in the descriptions of the "Corto or Coretya" (Map VI A) in Chapter VII and Curratty (Karatoya) Rivers (Map V) in Chapter VI.

323. If I am right in assuming that course to be the original course, then the Tista River has cut through the Karatoya near Dewangunge (Map VI A), to the detriment of the lower reaches of the latter river.

Credence is lent to this view by the well known importance of the Karatoya in early times. For it seems unlikely that that importance would have been given to any but a large river, and one of greater importance than the Karatoya in Rennell's time.

On Map XII will be found a river called the "Old Curratty" which joined the Foolju River near Shazadpour. This apparently is a beheaded remainder of an old main course of the river. The missing portion lies between Seerpour and Cauleah, but Rennell's map shows no obvious old river junction. It may be noted, however, that the interception was just below Seerpour and that the Foolju, in Rennell's time, carried off most of the water of the Curratty in a more direct course towards the low areas, than that which the Curratty, in earlier times, could have followed. The Foolju is therefore younger as a main stream than the Curratty.

Tista Creek.

324. The word Creek is misleading. Rennell often made use of the term to show that a minor stream, with the same name as a river, was actually of minor importance. I notice that this occurs in many cases, but Rennell makes no allusion to the special meaning of the word Creek, anywhere.

325. In the description of this Creek (Map VIA, Chapter VII), I have pointed out that the Goggot River occupied some 10 miles of the apparent old bed of the Tista Creek. The inference is that after the Tista Creek was well established, the Goggot came into being, or received excess water from the North, and reduced the supply of water to those reaches of Tista Creek as far to the East of the Goggot River.

Since Rennell's time the main Tista has left the main course as shown by Rennell, and has adopted the rough alignment of Rennell's Tista Creek.

326. The life history of Tista Creek would be very interesting if it could be traced. We know that in Rennell's time the main Tista flowed more or less due South from Jalpaiguri. And that Tista Creek may possibly have been an original main bed of the Tista before the Tista interfered with the régime of the Karatoya. And we may guess that at some time the main Tista may have run into the Karatoya by what Rennell shows as "Teesta River" on Map VIA, (see description of the Curratty River first paragraph, subparagraph (b), Chapter IV, page 30). It seems probable that at one time the Tista followed Tista Creek to the Brahmaputra near Chilmari. That it deserted that channel, at least to some extent, and became an affluent of the Karatoya through the "Teesta River" mentioned above. And that last of all, it beheaded the Karatoya, near Dewangunge, and reduced the Karatoya to comparative impotence. We also know that since Rennell's time the Tista has left Rennell's main channel, and taken up approximately that of Teesta Creek of Map VIA, but of the real causes of these changes there is difference of opinion. *

Attri (Attrai) River.

327. In the description of this river (see Tista River Chapter IV) its course has been traced from the Himalaya to the Ganges, near Jaffiergunge,

* The theories advanced in my report on the Nadia Rivers 1917 as to active depression in mid-Bengal, have been put aside on what I consider to be very flimsy grounds. I cannot see how any advancement can be made in the study of the Physical Geography of Bengal by contradiction unbacked by something tangible to replace a theory.

through Maps VIA, V and XII. It is in Map XII that complications have occurred in the régime of the Attri River, which once had the reputation of being a very important river.

The root of the trouble, as suggested by Rennell's map seems to lie some miles below the junction of the Attri and Jabunau Rivers, near Bellua. From that point onwards the importance of the Attri fails, and the Goor River takes off the greater part of the watersupply of the Attri to the Chalan Bhils. Lower down, the Barruly River seems to be a comparatively new channel which appears to have usurped the bed of the Attri North and North-East of Nattore, from Burrumpour to Digglecandy and to have beheaded the old Attri at the latter place. Thence the Barruly flowed East towards the Chalan Bhil, in two channells one of which is called by Rennell, Barally Creek, which obviously may be the old bed of the Barruly,* the name being very similar.

327. In my description of the depression which occurs in the middle of Map XII, (page 84), I have drawn attention to the peculiar position of the Attri's course on the West of, but roughly parallel to, the low lying areas. And I have suggested the deduction that these areas are of recent depression. The evidence of the decadence of the Attri seems to point in the same direction. It is significant of the Attri River that it is the only river on Map XII which retained its name right across that Map from North to South, in Rennell's time. The only other competitor is the Karatoya, which can be traced with breaks, as far South as Shazadpour. It seems a fair inference therefore that the latter river is older than the Attri. The other rivers of Map XII which may easily be younger than either of these rivers are the Goor and Burreyl, and those rivers whose names suggest possible recent origin (Jabbanaw, Joobnee and Isamutty).

The whole question of river distribution in the area of Map XII needs careful study, and in the remarks made above I have not attempted to pass beyond indications suggestive of possible fruitful investigation.

Isamutty River.

328. This river extended on Map XII to just below Cauleah. The name reappears on that Map just below Jaffiergunge; these two sections originally may have been joined between Belgutchy and Gundruckpour, from which place roughly the course of the Joobnee River may have been followed Southwards. There is no particular difficulty in finding an explanation for the gap, for it occurs in an area in which river changes obviously are little short of phenomenal. To explain, however, that the Isamutty once crossed the Dhaleswari bed is difficult, since the Isamutty would have to be the older river.

I do not propose to follow this matter further here.

Coni and Conoi Rivers.

329. The former is found on Map XII between Cauleah and Shahabazpour; and the latter from Attyah, South and South-Eastwards.

I only mention this case because of the similarity in name. If the river has been beheaded, and the Isamutty has been similarly treated, the lower reaches of the Coni River in Rennell's time must have occupied a course adopted after the beheading operations.

Dwarka River.

330. This river will be found on Map XIIIB; it joined the Bhagirathi above Cutwa, and seems to have been beheaded by the More River which in Rennell's time flowed between the two main blocks of the depression which lies West of Murshidabad.

If this is a true case of beheading, it points to a change in line of drainage by about 90 degrees; and it is noticeable that this would have occurred in the neighbourhood of a considerable low lying area.

*Rennell's spelling, as will have been observed, often varied greatly for the same names.

Serseti River.

331. This river occurs on Map XIVA. In describing the river in Chapter XV I have attempted to outline changes which seem to have occurred in its courses. If these are correct the Hooghly has cut through an original course of this river.

Comer River (Creek).

332. The whole course of this river is shown on Map XI. This river has been beheaded by the Chundnah and Burrashee Rivers (see descriptions of Comer Creek page 63 and of the lowlying area of Khulna, Faridpur and Backergunge, page 86). The possible earlier connection between the Comer Jhils (*Maps V and XII*) and the Comer Creek has also been mentioned at the beginning of the description of the Comer Creek (Chapter XII, page 64).

Boyrub River.

333. This river is shown on Map XI. It left the Jellinghy River just below Jellinghy Village, and with the exception of two lengths of river bed, the name is continuous down to the Ballisore River. The missing lengths in Rennell's time were occupied by the Issamot River (Damorda to Muttyara) and by the Cobbaduck River (Muttyara to Sonapurrah).

Jabunah Creek.

334. This Creek, or River, left the Hooghly (*Map XI*) opposite the old offtake of the Serseti River, which may be presumed to have been at least a main course of the ancient Bhagirathi (see description of Serseti or Saraswati River Chapter XV, page 86). The Jabunah is believed once to have been an important stream. The name persists from the Hooghly River to Savashpour on the Issamot River; and appears again on the Southern margin of Map XI. The missing portion in Rennell's time was linked up by the Issamot River. From the Southern margin of Map XI the name Jabunah is continued through Map XA to the sea face.

Dacca, Mymensingh and Sylhet Rivers.

335. The rivers considered under this head are the Brahmaputra and its old branches; the Meghna, and a few rivers West of the Meghna. The rivers are shown on Maps VIIIA and VIIA.

336. It has been observed in the description of the Burrampooter River in Chapter IV, page 18 that at its junction with a smaller river—the Megna from Sylhet (*Map VIIIA*)—the capital river loses its name.

An examination of Map VIIIA will show that the Lukya River or Little Burrampooter, and the Little Burrampootry lie to the West of the main course of the Megna from its junction with the main Burrampooter Southwards. Further a river called Burrampooter Creek lies between the Lukya and Megna.

Thus although in Rennell's time the Burrampooter proper ended at or near Sunerampour, the name of the larger river is perpetuated as far South as Feringhybazar, or 50 miles lower down than the name existed on the main course.

337. It needs little imagination to see that the three Brahmaputra courses crossed (if one follows a straight line) between Dacca and Sunarampour, may have been old courses of the main river. The following reasons occur in support of this theory:—

(a) The name Brahmaputra can be continued without a break downwards to near Feringhybazar.

(b) Rennell explained that the increase in size in the Megna bed below Feringhybazar could be explained by the tradition that the Ganges once flowed past Dacca. Only if two very large rivers had met near Dacca could the "amazing" bed of the Megna below Feringhybazar be explained, (see concluding sub-paragraph of description of the Brahmaputra River Chapter IV, page 21).

(c) The supposed old channels of the Brahmaputra lie in the sphere of area of the high land on which Dacca stands, although mainly within its out-lying blocks. If that high land was elevated slowly the Brahmaputra might have been pushed Eastwards just as it appears to have been pushed.

(d) The name Megna would persist without complication down to near Feringhybazar, and a minor river would not have suddenly destroyed the name of a far larger river near Sunerampour.

(e) The Megna River bi-furcated some 10 miles above Sunarampour. The Eastern Channel, known in its lower reaches as the Little Megna in Rennell's time, was joined to Rennell's main Megna at Sunarampour, Corattyah and Daoudnandy; near Gusipour this Eastern channel apparently has beheaded the Teetas River; near Corattyah the main channel has apparently beheaded the Little Megna for a short distance. At Daoudnandy a slight movement to the East, by the main Brahmaputra, would behead the Gomut River.

From the above it may be argued that the main Megna from Sunarampour to Daoudnandy was a channel of increased strength induced by the reinforcement of the water of the main Brahmaputra.

(f) If the Ganges and the Brahmaputra originally met below Feringhybazar, by Rennell's time their joint channel was known as the Megna, Southwards. There seems to be more excuse for two similarly sized capital rivers meeting and assuming the name of a third and smaller stream coming in at the conflux, than for the Megna to have eliminated the name Brahmaputra near Sunarampour.

(g) An examination of Maps VIIA and VIIIA together, along the Eastern side of the high tract shows the Banar River continuously from Pykenhaut on the Brahmaputra (*Map VIIA*) to Simulya (*Map VIIIA*). The area north of Bermyah shows a succession of channels near the North-East corner of the high land, which suggest the pushing away from the high land of river beds similar to that pushing away which may have occurred to the Brahmaputra on the South-East corner of the high land.

338. It would appear therefore that from Rennell's evidence above (and I have included no other evidence here), there is reasonable suggestion of close inter-relation between the river system of this area and the high land, which profitably may be further examined.

339. In this Chapter I have not attempted to point out every case of beheading or modified beheading of rivers, suggested by Rennell's maps. I have merely drawn attention to the more obvious cases and to some of their characteristics in the hope that sufficient attention may be drawn to a subject which so far, has been neglected seriously. The beheading of a river generally indicates a change in drainage flow, and to examine this subject fully, it is first necessary to try to discriminate between such changes as are due to surface movements of the land; and those due to a change in direction of a river, or of several rivers, induced by floods or artificial or other obstructions, which change of direction is rendered possible either by a high declivity in surface fall; or by such a low declivity that the balance of a river system is easily disturbed.

340. Rennell's maps and his other evidence throw considerable light on such an investigation as is proposed here; and sufficient is now known of the rivers of Bengal, to allow of a definite classification of the rivers being adopted. I suggested such a classification in my Report on the Nadia Rivers, 1917; but I notice that Mr. Addams-Williams has since produced another for

a more limited area than that covered by my own classification; Mr. Addams-Williams makes no reference to my classification (which I believe was the first that had been made). I make no complaint about the omission, but refer to it here to show that there is something wrong with a system of investigation, or historical writing on rivers, by which previously uncontradicted suggestions may be ignored. And to show the total lack of basis in present-day investigation of the Bengal Rivers, it may be remarked that no accepted definition exists as to what should be considered the deltaic tracts.

341. It may be thought to be beyond the province of these notes to mention these matters here. But it may be remembered that one of the objects of these notes is to describe—so far as material exists for such description—the river system of Bengal during a short period a century and a half ago, that period occurring (with few exceptions) before our rivers had been tampered with—directly or indirectly—by the hand of man.*

And full and proper use of these notes will not be made if the present system of non-co-operative effort is persisted in. But I notice that although in 1917 (Nadia Rivers Report) I advocated a more definite system of investigation, the old system still obtains. And that I was right is clear, because whilst on special duty on the Nadia Rivers I applied to the Port Commissioners for any papers they had regarding the reaches of the Hooghly River above the Howrah Bridge. The Chief Engineer said that the Port Commissioners had no papers and I believed him. It transpired (when Mr. Reak's report came out), that the Port Commissioners had much material all along, of which I could have made use. I have never attempted to reply to my critics of that time and will not do so here. Time will show who is right and who is wrong; but that time will be lengthened unnecessarily by lack of cohesion in the investigation of the river system of Bengal.

* The question of embankments may vitiate the statement. I have suggested in Chapter XIX that attempts be made to localize the embankments that are said to have existed in Rennell's time.

